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14. ABSTRACT

1200 individuals attended the 2007 International Meeting on Simulation in Healthcare and had access to panels, keynotes and workshop sessions to further their knowledge of use of simulation in healthcare to improve patient safety and manage resources. 26 workshops provided both hands-on and interactive learning in the areas of conducting research, outcomes based assessment, case development, disaster training, needs assessment and competency based training. Panels and keynotes addressed education, research, simulations operations, interactive environments, credentialing & assessment, clinical areas, economics of simulation and standardized patients. 72 peer reviewed abstracts were presented and are published in the Society's Journal, Simulation in Healthcare.

15. SUBJECT TERMS
Simulation, healthcare, credentialing, assessment

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Introduction

The International Meeting on Simulation in Healthcare (IMSH) is the official meeting of the Society for Simulation in Healthcare (SSH). The SSH mission is to bring together investigators, educators, and health care practitioners from a broad range of medical and paramedical specialties that are interested in health care simulation in all of its forms. IMSH featured keynote speakers, workshops, panels, research and "work in progress" poster and presentation sessions covering topics such as: surgical training devices, patient safety, curriculum development, simulation center operations, performance evaluation, developing metrics, debriefing simulation experiences, and training applications (crisis management, credentialing and assessment, faculty development, trauma, clinical emergencies, teamwork skills, etc.) This contract provided funding support for the conference faculty and publication of the research abstracts in the syllabus and the Society's peer-reviewed journal.

Body

Over 1200 individuals involved in simulation in healthcare attended the 2007 conference and participated in panels, workshops, per-reviewed research and non-peer-reviewed "work in progress" abstract presentations. The TATRC contract provided funds for the publication of the peer-reviewed research abstracts and support for the faculty of general session panels and workshops. The schedule below of the general sessions and workshops identifies the content areas covered by the conference and identifies the faculty experts participating. The appendix includes a pdf of the section of the syllabus for the peer-reviewed abstracts which is being published in Volume 2#1 of the Society's Journal, Simulation in Healthcare, and a pdf of the workshops (with named faculty) presented at the conference.

The growth in attendance, twofold over 2006, clearly indicates the growing interest and need for continued education in the area of simulation in healthcare at quality CME/CE activities such as IMSH. The research abstract authors benefited from individualized attention at the "Posterside Professor Rounds" whereby conference faculty interacted directly with the authors. Interaction and networking between attendees and faculty at the conference will likely result in additional research by individuals and new multi-center research opportunities.

Published research abstracts will be available on-line through the publisher and on the Society's website. With Small Conference Grant funding from AHRQ, selected sessions were video taped and will be made available to the public on-line on the Society's website. Selected faculty presentations are available on-line for conference attendees.

Monday January 15

7:00-8:00 **Affinity Groups**

8:00 – 8:30 Opening Fantasia H-J
Presidential Remarks –Society for Simulation in Healthcare and Society in Europe for Simulation Applied to Medicine
Daniel Raemer, PhD, Immed. Past President, SSH
Willem van Meurs, PhD.,President, SESAM
SSH and SESAM represent the international and the European Societies dedicated to improving healthcare through Simulation. Each speaker will give a brief update of their Society's activities.

8:30-10:00 GS I Fantasia H-J
2007 IMSH Welcome
Michael Devita, MD, IMSH 07 Chair
Michael S. Gordon Center for Research in Medical Education Lecture
Introductions: S. Barry Issenberg, MD, SSH Chair Development & Research and Michael S. Gordon, MD, PhD
Keynote Lecture: Lucian Leape, MD
The theme for the 2007 IMSH, Leading to Safer Healthcare, will be addressed through a look at the past, present and future of patient safety, identifying current tools and needs for cultural change, and the challenge to use current and future technology in novel ways.

10:30-12 noon GS II Fantasia H-J
Simulation for Healthcare Education
Moderator: Lindsey Henson, MD
Panel: K. Anders Ericsson, PhD and Margery Davis, MD
Faculty will discuss measurement of skilled performance guides assessment of detailed acquired cognitive mechanisms, analysis of and estimates of the amount and type of deliberate practice is required and the global trends in medical education.

10:30-5:45 SCO Grand Republic
Simulation Center Operations Track
Individual sessions are listed on following page. Learners may attend any or all track sessions.

10:30-4:00 Workshops offered concurrently

12-1:30 RT 1 Fantasia K
Simulation Hardware
Moderator: Amitai Ziv, MD MPH
Future needs or ideas for development of mannequins and simulation hardware and software

12-1:30 RT 2 Fantasia K
Special Project Funding Sources
Moderator: Lisa Sinz, MD

1:00-2:30 GS IV Fantasia J
SP 1 – 30 Yrs of High Fidelity with Standardized Patients
Moderator: John Shatzer, PhD
Panel: Jack Boulet, PhD, Emil Petrusa, PhD, Tony Errichetti, PhD, Reed Williams, PhD
This first panel on Standardized Patients will address issues still remaining regarding measurements, a developmental approach to measurement, running a multi-approach center and Fidelity – how high is enough?

3:00-4:30 GS V Fantasia H
Economics of Simulation - Is There an ROI That can Transform Healthcare Education?
Moderator: Jeffrey Cooper, PhD
Panel: John Schaefer, MD, Jay Ober, PhD(c), ARNP, BC, and Jeffrey Cooper, PhD
This panel will identify ways in which the value of simulation can be justified so that someone would be willing to pay for it; how malpractice carries are supporting simulation; and a business model based on reducing the costs of training to justify the use of simulation-based education.

3:00-4:00 GS VI Fantasia J
SP 2 – Pushing the Boundaries with Standardized Patients
Moderator: John Shatzer, PhD
Panel: Roger Kneebone, MD, Daniel Klass, MD, Michael Williams, MD, Robyn Tamblyn, PhD, Mathew Weinger, MD
This panel will continue with SPs and discuss blended simulations, quality improvement of practicing physicians, complex simulations and use of SPs in healthcare research.

5:00-6:30 RT 3 Fantasia K
Instructor Development
Kim Yaeger, RN
Best ways to provide instructor training and quality assurance of instruction

5:00 – 6:00 RT 4 Fantasia M
Pharmacy Simulation
Moderator: Amy Seybert, PharmD
Simulation for undergraduate pharmacy education

5:00-6:30 RT 5 Pastoral 2
Pre-Hospital Care Simulation
Moderator: Geoff Miller, MD
Creating and developing simulation programs for pre-hospital care providers

Numerous government and private sector agencies providing funding for simulation research and programs

1:00-2:30 GS III Fantasia H

Teams and Risk Management for OBGYN Teams and Risk Management for OBGYN

Moderator: Louis Halamek, MD

Panel: University of Pittsburgh OB Team: Gabriella Gosman, MD, Patricia Dalby, MD, Hyagriv Simhan, MD, Karen Stein, BSN, MEd, CCRN, Nancy Wise, RNC, BSN, Patricia Nelson, BNS, MHRM, RNC: Stanford University OB Team: Steven Seth Lipman, MD, Kay Daniels, MD, Julie Arafeh, RN MSN, Denise Lopez, RN

Two OB/GYN teams will address the challenges and successes in incorporating simulation into their team approach to risk management of GB/GYN

6:30-8:00 **Welcome Reception with Exhibitors**

Schedule Notes

GS=General Session
RT= Roundtable Discussion
SCO= Simulation Center Operations Track

Schedule as of 11/15/06. Changes to the schedule or faculty will be announced from the podium.

Tuesday January 16

7:00-8:00 **Affinity Groups**

8:00-8:30 **SSH Annual Meeting** Fantasia H-J
The new SSH Board of Directors and Committee Chairs will be announced. An update on the SSH Strategic Plan and report of the 06 Simulation Summit will be presented by President Lisa Sinz.

8:30 – 9:30 GS VII Fantasia H-J
Keynote - Ingrid Philibert, MHA MBA
The Impact of Simulation on National Goals for Education and Safety Research
This keynote will address how incorporating simulation as a "best practice" and "innovative ideas" are influencing academic medical education.

9:30-10:00 GS VIII Fantasia H-J
Abstract Presentations by Award Winners
Elizabeth Hunt, MD MPH and Towa Sawa, MD PhD Abstract Chairs
Professor Rounds
IMSH Faculty will be discussing the research, peer-reviewed poster abstracts with the authors and audience

10:00-11:00 Exhibit area

10:30-4:00 Workshops offered concurrently

10:30-5:00 and Wednesday 8:00-9:00 am NF
Nursing Forum – Grand Republic
Individual sessions are listed on following page. Learners may attend any or all forum sessions.

11:00-12:30 GS IX Fantasia H-J
Credentialling & Assessment
Moderator: John Schaefer, MD
Panel: Jack Boulet, PhD, Richard Kyle, MS, Jerry Potts, MD
This panel addresses why certain types of training uses simulation, the practical issues surrounding its use, assessment tied to use of simulation and how assessment is being used directly or indirectly for clinical credentialing and/or privileges.

11:00-12:30 RT 6 Pastoral 2
TATRC Update
Moderator: Gerry Moses, PhD or designate
Current and proposed programs and special project reports will be addressed.

11:00-12:30 RT 7 Pastoral 3
Research in Simulation Centers
Moderator, William McGaghie, MD
Current and future multi-center and individual center studies will be discussed.

1:00-2:30 RT 8 Pastoral 2
Curriculum Management
Moderator: John Vozenilik, MD
Strategies and the need? to develop standards will be the focus of discussion.

1:00-2:30 RT 9 Pastoral 3
Simulation Center Credentialing
Moderator: Michael Olympio, MD
Investigation of the issues and concepts involved in credentialing simulation centers and/or programs.

1:00-2:30 GS X Fantasia H
Virtual Interactive Environments I
Moderators: Jeffrey Taekman, MD and J Harvey Magee:
Panel: Benjamin Sawyer, Bryan Bergeron, MD, Renee Stout, MD
This first of two sessions on virtual environments will give an overview of virtual reality applied to medical "simgames" and discuss designing serious games for healthcare education and training.

1:00-2:30 GS XI Fantasia J
Pediatrics
Moderator: Mary Patterson, MD MEd
Panel: Elizabeth Hunt, MD and Karen Frush, BSN MD
Opportunities to use simulation for pediatrics in the ICU, Emergency Department and throughout the hospital will be evaluated and methods of incorporating simulation in training the multi-disciplinary teams serving the pediatric population.

3:00-4:30 GS XII Fantasia H
Virtual Interactive Environments II
Moderators: Jeffrey Taekman, MD and J Harvey Magee
Panel: Steve Cole, MD and Mark Widerhold, MD
This second session addresses systematic training principles applied to medical training and the use of virtual environments to accomplish innovative training and education.

4:00-6:00 RT 10 Fantasia J
Simulation Center Coordinators
Moderators: Tom Dongilli and Yue Ming Huang, EdD MHS
This RT is divided into two sessions. The first will identify specific skills for specific jobs within a simulation center such as the Director or Administrator. The second session will be an open forum for Center Coordinators to identify content for the 08 Sim Center Operations Track and bring forth issues to be addressed by the Society.

7:00-10:00 **It's a Pirate's Life – Networking Reception**

Wednesday January 17

8:00-9:30 GS XIII Fantasia H
Using Simulation to Address Public Health Issues
Moderators: John Hotchkiss, MD and Joy Spellman, MSN
Pathogens, patterns and prevention – simulation approaches to infection control will be discussed plus current simulation approaches and their advantages are identified.

8:00-9:00 NF Nutcracker 3
Continuation of Nursing Forum

Schedule Notes

GS=General Session
RT= Roundtable Discussion
NF=Nursing Forum

Schedule as of 11/15/06. Changes to the schedule or faculty will be announced from the podium.

10:00-11:30 GS XIV Fantasia H
Developing a Career of Excellence in Healthcare Simulation
Moderator: S. Barry Issenberg, MD
Panel: Diane Wayne, MD, Chris Candler, MD, Paul Phrampus, MD
This panel will provide perspective on the opportunities for developing a career of excellence in healthcare simulation and discuss projects that range from performing outcomes-based research studies, developing peer reviewed training and testing materials to developing and operating a self-sustaining, multidisciplinary, multi-professional simulation training center.

11:30-12:00 GS XV
Wrap Up
Michael Devita, MD, 07 IMSH Chair, S. Barry Issenberg, MD and Marcus Rall, MD, 08 IMSH Chairs

Special Track & Forum Schedules

Simulation Center Operations Track

Grand Republic Ballroom

Monday 1/15

Tom Dongilli and Yue Ming Huang, EdD MHS: Session Chairs

10:30-11:30 SCO 1
Small to Large Centers
Moderator: Thomas Dongilli
Panel: Elizabeth Hunt, MD; Shan Sieg
Successful stories and overview of various sized centers. How these different size simulation centers operate and address operational issues.

11:30-12:15 SCO 2
Get Them/Keep Them
Moderator: Peter Diekmann, PhD
Panel: Stephen Donahue BS RRT, Randolph Steadman, MD
How to get faculty to buy into simulation, finding the champion at your site, and public relations and marketing

1:00-1:45 SCO 3
Funding & Financial Planning
Moderator: Yue Ming Huang, Ed MHS
Panel: William Atkinson, PhD, MPH; Patrizia Angelotti, Dphys
Focus on budgets, business plans, revenue generation from those who have planned successfully. Identification of what traps to avoid.

1:45-2:30 SCO 4
Center Space Design and Allocation
Moderator: Steve Nelson, CEEMTP
Panel: Guillaume Alinier, Mphys, Trond Harald Olson, CRNA
Identify and allocate space and design considerations – who and what should be included.

3:00-3:45 SCO 5
Sim Center Management/Operations
Moderator: Guillaume Alinier, Mphys
Panel: Peter Dieckmann, PhD, Yue Ming Huang, EdD MHS
Identifying personnel roles, job descriptions, training, quality assurance, scheduling, technical support and data organization.

3:45-4:30 SCO 6
Military Simulation Centers
Moderator: Tom Dongilli
Panel: Col. Al Morgan, Ret, Major Timothy Davies
Military Simulation Centers are often cutting edge and are in the forefront of training for military operations.

5:00-5:45 SCO 7 **Panel & Final Thoughts**
Panel: Track Faculty

Nursing Forum

Grand Republic Ballroom

Tuesday 1/16

Bernadette Henrichs PhD, CCRN and John O'Donnell, CRNA, MSN: Session Chairs

10:30-11:30 NF 1
Simulation in Pediatrics
Kimberly Yeager, RN BSN
This lecture focuses on the design and implementation strategies for simulation-based education and training of nurses in pediatrics

11:30-12:30 NF 2
Community Network for Optimizing Simulation in Nursing
Panel: Jana Berryman, ND, CNE, RN, and Paula Gubrud, RN
The panel faculty will elaborate on opportunities and resources for developing an optimized simulation program for nursing

1:00-2:00 NF 3
Designing Simulations Using an Evidence-Based Simulation Model
Debra Spunt, MS, RN FAAN
Curriculum development and case scenario writing using evidence-based simulation models for nursing education and training will be presented.

2:00-3:00 NF 4
OB Simulation Models/Student Learning
Panel: Deborah White, PhD CRNP, Donna Abriola, RN and John O'Donnell, RN
The various simulation models used for student learning in OB will be presented.

4:00-5:00 NF 5
Using Simulation to Expand Nursing Research
Jeff Groom, PhD CRNA
This lecture will enable nurses to evaluate simulation-based nursing research and potentially increase their involvement in research efforts.

Wednesday am 1/17

8:00-9:00 Wed am NF 6 Nutcracker 3
Patient and Provider Safety in Nursing Education
John O'Donnell, CRNA, MSN and Bernadette Henrichs, PhD, CCRN
This panel will be focusing on the importance of patient and provider safety and the incorporation of simulation in nursing education.

Workshop individual descriptions are included in the appendix.

Monday January 15					
	Nutcracker 1	**Nutcracker 2**	**Nutcracker 3**	**Fantasia M**	**Pastoral 2**
10:30-11:15	1 (Post-grad training)	2 (Obstetric Simulations)	3 (Procedures for medical students)	4 (Manuscript Preparation)	
11:45-12:30	5 (Adv. Team Training)				
1:00-2:30	6 (Practicing Apology)	7 (Faculty Development)	8 (Conducting Research)	9 (Communication Skills)	
3:00-4:30	10 (Operations, Tools, Props)	11 (Multi-level Training)	12 (Outcomes-based Assessment)	13 (Case Develop)	14 (Applying Educational Theory)
Tuesday January 16					
	Nutcracker 1	**Nutcracker 2**	**Nutcracker 3**	**Fantasia M**	
10:30-12:00	15 (Optimal Learning Environment)	16 (Disaster Training)	17 (Principles of CRM)	18 (Using Multiple Simulations)	
1:00-2:30	19 (Muti-disciplinary Training)	20 (Outcome Measures)	21 (Rapid Response Teams)	22 (Using Multiple SPs)	
3:00-4:30	23 (Competency-based Training)	24 (Setting Performance Standards)	25 (Ethical Dilemmas)	26 (Needs Assessment)	

Key research accomplishments

None

Reportable Outcomes

- 72 Peer-reviewed abstracts presented at the 2007 IMSH conference and subsequently published in the Journal
- 26 Peer-reviewed workshop presentations in interactive format
- 15 General session and keynote presentations plus two special content tracks (Simulation Center Operations and Nursing)
- With funding available from this contract for faculty support, SSH was able to secure a small conference support grant from AHRQ to fund video and audio taping of the keynote and selected panel presentations to be made available with public access on the Society's website www.ssih.org

Conclusions

As a result of this project, the current research being conducted by those in the simulation in healthcare field was disseminated to over 1200 individuals and further distribution of this information will be available in the public domain through the Society's journal publisher and the Society's website.

References

None

Appendices

1. Workshop descriptions published in the 07 IMSH syllabus
2. Peer-reviewed research abstracts published in the 07 IMSH syllabus and subsequently published in the Society's Journal, *Simulation in Healthcare*

Appendix 1

Workshop #1
Time: Monday January 15 10:30 am
Location: Nutcracker 1 **Size:** up to 150

Use Of Simulation For Intern Training In Patient Safety: Experience In The US And Israel.
David Birnbach[1], Haim Berkenstadt[2], Amitai Ziv[2], Ilya Shekhter[1]
[1]Miller School of Medicine, University of Miami, Miami, FL, [2]Israel Center for Medical Simulation, Sheba Medical Center, Israel

Workshop Abstract:
This interactive workshop will illustrate how simulation has been integrated in Patient Safety training for interns at two institutions, University of Miami – Jackson Memorial Hospital in Miami, FL, USA, and the Israel Center for Medical Simulation (MSR) in Tel Hashomer, Israel. This interactive workshop is designed to provide guidance to participants on how to develop and implement a simulation-based curriculum that teaches communication and patient safety skills to interns prior to them assuming direct patient care responsibilities.

Description of workshop topic and rationale for importance
The overall goal of the intern training in Patient Safety is to train new physicians in the attitudes, knowledge, and skills required to achieve safe patient care. In most residency programs, interns come from numerous medical schools often with different exposure and awareness of Patient Safety. A structured, required course provided during the orientation week for new interns enables an institution to guarantee basic house staff competency in Patient Safety. Furthermore, the course allows the institution to assess the effectiveness of its interns' prior Patient Safety training. In this workshop, presenters will illustrate how simulation has been integrated into intern training at two institutions, University of Miami – Jackson Memorial Hospital in Miami, FL, USA, and the Israel Center for Medical Simulation (MSR) in Tel Hashomer, Israel. This interactive workshop is designed to provide guidance to participants on how to develop and implement a simulation-based curriculum that teaches communication and patient safety skills to interns prior to them assuming direct patient care responsibilities.

Learning objectives
1. Explain the rationale for providing patient safety and teamwork training to interns before they begin to provide patient care.
2. Describe how a simulation-based patient safety curriculum offers advantages over alternative methods of teaching patient safety concepts.
3. Identify and discuss the challenges of providing effective simulation-based training across multiple specialties.
4. Describe the similarities and differences of the Miami and Israeli approaches to patient safety and teamwork training for interns and explain how these may be applied to a local program.

No significant financial relationships with commercial entities were disclosed by all authors

Workshop #2
Time: Monday January 15 10:30 am
Location: Nutcracker 3 **Size:** up to 50

The Relative Merits Of Obstetric Simulation Conducted At A Simulation Centre And Within Local Hospitals.
Joanna Crofts, Tim Draycott
Department of Obstetrics and Gynaecology, North Bristol NHS Trust, Southmead Hospital, Bristol, BS10 5NB, UK

Workshop Abstract:
The SaFE study investigated the relative merits of local hospital and simulation centre OB training using videoed simulated emergencies pre-training and to one year post-training.140 staff were randomized to training .All training improved clinical management, team working and communication. Simulation centre training was more popular local training further improved communication with patient-actor. Lessons learnt from running an OB educational-RCT trial will be shared. The workshop will provide an opportunity to participate in OB simulation.

Description of workshop topic and rationale for importance
OB simulation training is required; the Confidential Enquiries into stillbirths, deaths in infancy and maternal deaths estimate about half of deaths could be preventable with better care. Poor communication and team working within multi-professional obstetric and midwifery teams has been repeatedly highlighted. The Joint Commission of Accreditation of Healthcare Organization in USA also found similar problems. Simulation training has been recommended by both institutions to address poor outcomes. OB simulation training should lead to safer healthcare for mothers and their babies.

There is some early evidence of the benefit of OB simulation training in two hospitals, both of which were set up and conducted 'in-house', and trained 100% of staff. A reduction in low Apgar score, Hypoxic-ischaemic encephalopathy (HIE) and brachial plexus injuries associated with shoulder dystocia have been reported at Southmead Hospital, Bristol, UK after the introduction of OB simulation training; whilst The Beth Israel Deaconess Medical Center in Boston, USA initiated CRM team training for all clinical staff in labour and delivery and report a 25% overall reduction in adverse obstetric events since the training was introduced. However, OB training in simulation centres has many potential benefits over local training: the use of video feedback, protected teaching time and expert trainers.

The SaFE study was instigated to investigate the relative benefits of multi-professional OB simulation training conducted in local hospitals, a simulation centre with and without the inclusion of teamwork training. Participants (140 midwives and doctors) from six hospitals were randomized to one of four multi-professional obstetric emergency training interventions:(i) one day local hospital obstetric emergency clinical training course (ii) two day local hospital obstetric emergency clinical and teamwork training course, (iii) one day simulation center obstetric emergency clinical training course, or (iv) two day simulation center obstetric emergency clinical and teamwork training course.

Learning objectives
1. Discuss the advantages and disadvantages of multi-professional OB simulation training in local hospitals and simulation centres
2. Participate in two OB simulations
3. Learn how to run OB simulations
4. Be aware of the potential pitfalls of conducting educational trials in OB simulations–sharing lessons learnt from the SaFE Study

No significant financial relationships with commercial entities were disclosed by all authors

Workshop #3
Time: Monday January 15 10:30 am
Location: Nutcracker 3 **Size:** up to 50

Creative Ways To Implement A Simulation Based Procedural Curriculum For Medical Students..
Sorabh Khandelwal MD, Michael Rubin, Carol Hasbrouck, Dan Clinchot, John Hill
Ohio State University Medical Center, Columbus, OH

Workshop Abstract:
The incorporation of simulation into medical education is steadily increasing, but implementing simulation experiences into the curriculum is challenging due to time constraints and costs. At Ohio State, a mandatory clinical skills experience for third year medical students was implemented. This workshop will provide hands-on experiences making simulations from every day materials, will allow practice on simulators, and will describe how this intensive procedure-based curriculum was instituted in a short period of time.

Description of workshop topic and rationale for importance
Medicine is constantly progressing and changing so the methods by which we teach our medical students should follow suit. However,

implementing simulation experiences into the curriculum can be challenging due to time constraints and costs. At The Ohio State University College of Medicine, the faculty and administrators decided it was time to overcome the challenges and implement a mandatory clinical skills experience for all 210 third year medical students. Every eight weeks, 36 of the third year students are assigned to the Clinical Skills Immersion Experience for seven days .During that time they are exposed to 16 procedures and a few ATLS hands-on related skills. Exposing students, rather than lecturing to them, gives an excellent working knowledge of the procedures. The students are provided with readings, videos and hands-on experiences. Indications and contraindications for procedures are also taught so that students not only learn how to do a procedure, but also when it would be appropriate. Students receive formative feedback during the experience and are tested at the end. It is unlikely that we'll make anyone an expert on 16 procedures in 7 days, but what we do is give these students more confidence to succeed before sending them on their own into today's medical society.

Offering such a course can be expensive, especially when it comes to purchasing replacement materials for simulators, so our faculty and staff developed ways to make some of their own simulators with everyday materials. In this workshop, we would like to discuss and show how we use everything from cadavers to balloons and tapioca to make inexpensive and very effective simulations. We will discuss how we went from having a limited procedural based curriculum to 7 days of an intensive procedural curriculum in 5 months. We will show a video of most of our procedure training and give the audience a chance to practice and make some of our "home made" simulators. Our rational in wanting to do this is we believe that cost of simulation is the biggest road block in procedure based medical education. With that in mind we want to show how using everyday items can be used very effectively to help further the education of our students.

Learning objectives

1. Discuss opportunities for implementing simulation sessions into the curriculum
2. Create selected inexpensive simulations
3. Discuss the development of other simulations with everyday materials.
4. Through small group interaction, discussion of other useful simulation.

No significant financial relationships with commercial entities were disclosed by all authors

Workshop #4
Time: Monday January 15 10:30 am
Location: Fantasia M **Size:** up to 50
This workshop is sponsored by SSH

Interactive Workshop On How Manuscripts Are Reviewed, Revised, And Ultimately (The Author Hopes) Accepted By The Journal *Simulation In Healthcare*.
David Gaba[1]
[1]Simulation in Healthcare, Palo Alto, CA,[2]Stanford University School of Medicine, Stanford, CA,[3]VA Palo Alto Health Care System, Palo Alto, CA

Workshop Abstract:
The purpose of the workshop is to familiarize participants with the process journals use (especially Simulation in Healthcare) to review MS, consider revisions, etc. and to give participants some hands-on experience and group discussion at reviewing MS and preparing a response to the critiques of the reviewers.

Description of workshop topic and rationale for importance
The purpose of the workshop is to familiarize participants with the process journals use (especially *Simulation in Healthcare)* to review MS, consider revisions, etc. and to give participants some hands-on experience and group discussion at reviewing MS and preparing a response to the critiques of the reviewers. In so doing, key points of preparing sound manuscripts will be elucidated, but research design and primary writing of the MS is outside the scope of such a workshop. The faculty will primarily be drawn from the Editorial Board of *Simulation in Healthcare* and others who have reviewed papers for the Journal.

Many people active in simulation do not have much experience writing manuscripts and submitting them to peer-reviewed journals. Some have little mentorship available in this process. While they may also lack experience in research design and writing, there are many venues and modalities available to help them learn these things. One aspect that few know much about unless they have done significant reviewing for a peer-reviewed journal is the process of conducting the peer-review .Moreover, only those with long (bitter) experience have learned how to read between the lines of the editor's letter, and how to produce a suitable revision. Many do not understand the criticality of the point-by-point response to reviewers. This workshop will address these issues and give participants a little hands-on experience at reviewing and responding to critique.

Learning objectives

1. Express familiarity with the key elements of reviewing a manuscript
2. Express familiarity with the process SiH uses to review manuscripts
3. Read a short paper and provide a written cogent critique of strengths and weaknesses
4. Discuss their critique with others
5. Express familiarity with key elements of responding to the reviewers' critique
6. Provide a written point-by-point response to criticisms raised by another reviewer

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 5
Time: Monday January 15 11:45 am
Location: Nutcracker 1 **Size:** up to 50

Team training beyond Advanced Life Support: Is it all that important.
Judy LeFlore[1]*, Mindi Anderson*[1]*, JoDee Anderson*[2]
[1]UT Arlington, Arlington, Texas,[2]Oregon Health & Science University Portland, Oregon

Workshop Abstract:
This workshop will involve a demonstration in team training for the "expert" using high-fidelity simulation and will include a discussion on team effectiveness based on Crisis Resource Management. The scenario used will involve a simulated infant in respiratory distress based on Pediatric Advanced Life Support (American Heart Association, 2002). Components of team training, scoring of team behaviors, debriefing, and lessons learned from team training with expert transport teams will be presented.

Description of workshop topic and rationale for importance

Healthcare professionals are expected to make rapid, accurate decisions in life-threatening emergency situations, despite what they may lack in real, practical experience. Historically, preparing healthcare professionals to handle these emergencies in the clinical arena has involved academic preparation, clinical orientation to their new role, followed by gradually assuming more responsibilities as he/she is immersed into new and unfamiliar clinical situations. Some refer to this as education by random opportunity (Allen et al., 1991; Halamek et al, 2000; Schull, Ferris, Tu, Hux, & Redelmeier, 2001). The concept of "learning by doing" or "see one, do one, teach one "has become a less acceptable way for healthcare professionals to gain the clinical experience to the rare emergency. Traditional education and on-the-job training focuses on cognitive and technical skills. Standardized training programs, such as Pediatric Advanced Life Support (PALS), aim teaching toward a hierarchal approach to emergencies. Little attention, however, is given to the development of effective behavioral skills, which includes communication skills and working as an effective team member, in traditional or standardized training.

Learning objectives

1. Discuss the concepts associated with Crisis Resource Management and team training
2. Apply use of high-fidelity simulation to training of expert teams.
3. Describe scoring of Behavioral Assessment Tool.

COI Disclosure statement.
UT Arlington School of Nursing is a Laerdal Center of Excellence.

Workshop # 6
Time: Monday January 15 1:00 pm
Location: Nutcracker 1 **Size:** up to 50

Managing Difficult Conversations–Using Simulation to Practice: Disclosure and Apology.
Roxane Gardner, MD MPH[1,2], Toni Walzer, MD[1,2], Robert Simon, EdD[2,3], Dan Raemer, PhD[2,3]
[1]Department of Obstetrics &Gynecology of Brigham &Women's Hospital, Boston, MA,[2]Center for Medical Simulation, Cambridge, MA,[3]Department of Anesthesia and Critical Care of Massachusetts General Hospital, Boston, MA

Workshop Abstract:
Health care providers receive little training or opportunity to practice disclosure and apology for error or untoward outcomes of clinical events. We use a series of simulated scenarios for debriefing medical error, allowing practitioners to practice difficult conversations in the aftermath of adverse clinical outcomes. In case one, the participants realize a medical error has occurred and must manage it and debrief it as a team. In the second case, the participants realize the medical error and must disclose and apologize for the error to the live, standardized patient. Thereafter, they will debrief the event and discuss how best to manage future similar events.

Description of workshop topic and rationale for importance
Obstetricians and other health care providers receive little training or opportunity to practice disclosure and apology for medical error or other untoward outcomes of clinical events. Participants can learn to managed difficult conversations, practicing disclosure and apology through simulated scenarios involving medical errors. The scenario use patient simulation and a standardized patient, including a manikin and live individual to facilitate realistic and interactive dialogue typifying a real clinical situation. Participants will 1) take part in simulation; 2) discuss the issues related to medical error-psychological, sociological, institutional, legal and clinical; 3) debrief the disclosure and apology of the error that occurred with the live, standardized patient; 4) discuss ways to construct similar scenarios for disclosure and apology in other disciplines.

Learning objectives
1. Understand the psychological, sociological, institutional, legal and clinical issues involved in medical error from the personal and organizational perspective.
2. Understand an approach to debriefing scenarios involving medical error or other adverse clinical outcomes.
3. Understand an approach to disclosure and apology for medical error or other adverse clinical outcome.
4. Draft a scenario involving medical error for the practice of debriefing, disclosure and apology suitable for one's professional setting.

No significant financial relationships with commercial entities were disclosed by all authors

Workshop #7
Time: Monday January 15 1:00 pm
Location: Nutcracker 2 **Size:** up to 50

Clinical Faculty Development: Using Simulation to Demonstrate and Practice Clinical Teaching.
Lorretta Krautscheid, Joanna Kaakinen, Joanne Warner, Joanna Kaakinen
University of Portland, Portland, OR

Workshop Abstract:
Students spend more time in clinical with smaller faculty-to-student learning ratios than in didactic. Yet, many clinical faculty have had little exposure to evidence-based teaching strategies and learning theories. Simulation provides a viable method to provide consistent and comprehensive initial and ongoing education for clinical faculty. The clinical teaching simulations presented in this workshop demonstrate the use of simulation as a technique for nursing faculty to acquire and actively practice evidence-based clinical teaching strategies.

Description of workshop topic and rationale for importance
The clinical teaching simulations presented in this workshop will demonstrate the use of simulation as a technique for clinical nursing faculty to acquire and actively practice evidence-based clinical teaching strategies. Participants will engage in learning teaching strategies via recorded simulation presentations, written reflection guides, group discussion and reflection on examples of both poor teaching practices and evidence-based teaching practices. Participants will compare and contrast teaching strategies that support and hinder learning. Resources required to implement Clinical Faculty Development simulations will be discussed.
Like most teachers without formal knowledge of teaching and learning, many clinical faculty teach intuitively or similar to the way they were taught. Inadvertently, they may miss teaching opportunities or hinder the student's learning. A typical mistake of new teachers is to focus on what they think is important to teach (teaching-focused paradigm) instead of on what the student needs to learn (learner-focused paradigm) or is having difficulty learning. While the benefits of simulation are well documented for nursing students, applications for use are not well documented with experienced clinicians. The Clinical Faculty Development simulations described here demonstrate how simulation may be utilized for clinical faculty. Faculty development simulations provided a viable method for both novice and seasoned clinical faculty to actively learn, practice and reflect upon effective teaching strategies in a consistent and controlled setting with feedback from master teachers and student nurses.

Learning objectives
1. Describe clinical teaching practices that facilitate and hinder student learning.
2. Compare and contrast poor and best clinical teaching practices.
3. Reflect on teaching strategies that assist with student learning to include:
a. Role modeling professional nursing behaviors: communication, leadership, skills performance and clinical reasoning.
b. Reflection on practice.
c. Methods of providing specific, constructive and non-blaming feedback.
d. Assisting with learning vs. rescuing students.
e. Asking questions to stimulate critical thinking and problem solving.
4.Describe resourced required to implement Clinical Faculty Development simulations.

No significant financial relationships with commercial entities were disclosed by all authors

Workshop #8
Time: Monday January 15 1:00 pm
Location: Nutcracker 3 **Size:** up to 150
This workshop is sponsored by SSH

Designing Simulation-Based Educational Research.
William McGaghie[1], Viva Siddal[1], Emil Petrusa[2]
[1]Northwestern University Feinberg School of Medicine,[2]Duke University Medical School

Workshop Abstract:
While simulation-based education continues to grow, a recent systematic review revealed substantial flaws in study designs that limited the interpretation and synthesis of findings to support its use. This workshop will address these flaws by identifying features of good educational research. Participants will participate in developing research questions, designing studies and interpreting results. This workshop is intended for participants who want to become knowledgeable in conducting simulation-based education research.

Description of workshop topic and rationale for importance

The faulty will provided brief interactive presentations on the most essential aspects of simulation-based medical education research. These will be integrated with several breakout sessions in which participants will create and critique research questions or hypotheses, study designs and appropriate interpretations of study results. These sessions will be facilitated by workshop faculty.

A recent best evidence systematic review of the literature on simulation-based education identified substantial flaws in research methods and study design that limited the ability to conduct a formal meta analysis. Heterogeneity of research designs and study quality, un-standardized outcome measures and wide variation in details given in journal articles (e.g., many fail to report means, standard deviation and reliability coefficients) made a quantitative synthesis of the research evidence impossible. The lack of unequivocal evidence for much of the research in simulation-based medical education clearly calls for better research and scholarship in this field. Academic responsibility includes creating new knowledge about one's field. Educational use of simulations is central to the future of medical education, but only sound educational research will provide useful knowledge about effectiveness of simulation as an educational intervention. This workshop will identify key features of educational research to improve the quality of simulation-based educational research.

Learning objectives

1. Identify and describe sources of worthwhile questions for study
2. Identify and describe a good, researchable question or hypothesis
3. Identify and describe strengths and limitations of basic study designs
4. Identify and describe differences between constructs and measures of them
5. Identify and describe data analysis
6. Identify and describe variations in reporting results
7. Identify and describe good interpretation of results

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 9
Time: Monday, January 15 1:00 PM
Location: Fantasia M **Size:** up to150

Teaching and Assessing Medical Team Communication Through Simulation Training: Development of a Medical Communication Training Model, Assessment Tool and Debriefing Guide.
Jose Pliego[1], Tony Errichetti[2]
[1]Obstetrics&Gynecology Department, Texas A&M Health Science Center College of Medicine, Scott & White and Temple College Clinical Simulation Center,[2]New York College of Osteopathic Medicine

Workshop Abstract:
This hands-on interactive workshop will give participants the essential knowledge, skills and abilities to implement a medical team communication model that is based on a validated communication rating scale and team training guide. The SimCom communication rating scale operationally defines salient medical team communication tasks (e.g. establishing team leadership, managing intra-team communication, etc.). The SimCom is used to both train and assess medical teams during simulated clinical encounters, and provides feedback and debriefing material.

Description of workshop topic and rationale for importance
The faculty will provide a brief interactive presentation on how to employ simulation modeling to improve patient outcomes through effective team communication. The SimCom team communication ratings scale will be introduced and faculty will give examples in how to use the SimCom team communication rating scale in clinical simulation training. The participants will have the opportunity to apply the SimCom ratings scale during clinical simulation scenarios and will have the occasion use the information for feedback and debriefing.
The Institute of Medicine To Err is Human estimated that many errors in treatment at US hospitals are attributed to system level failures and failures in communication and teamwork. The main goal of the SimCom training program is to teach and assess communication skills in multidisciplinary teams during clinical simulation training. Patient safety researchers have found training multidisciplinary teams using simulation to be an effective strategy for reducing surgical errors .Draycott et al (2006) demonstrated that simulation-based team training in obstetrical emergencies is associated with a significant reduction in low 5-minute APGAR scores and perinatal asphyxia and nenonatal hypoxic-ischemic encephalopathy. Training multidisciplinary teams using simulation is a patient safety strategy that moves beyond individuals to dynamic team training, and simulation crosses divisions within and between organizations and allows communication, accountability, and the development and maintenance of effective multidisciplinary teams. Increasingly, simulation team training may become a strategy for hospital credentialing: JCAHO recommended in a Sentinel Alert issued in July 2004 that organizations conduct team training in prenatal areas to teach staff to work together and communicate more effectively.

Learning objectives

1. Discuss principles of performance training and assessment
2. Identify the rationale for the use of simulation to improve patient outcomes
3. Understand how to apply the simcom for team training and assessment
4. Identify the use of these innovative technologies to enhance debriefing and feedback

COI Disclosure Statement.
Dr. Pliego: speaker for Laerdal and Education Management Solutions (EMS). Dr. Erichetti: academic consultant EMS
Workshop # 10
Time: Monday January 15 3:00 pm
Location: Nutcracker 1 **Size:** up to 50

Setting the Stage in the ICU-Props, Moulage, Tips and Tricks.
Cheryl Paulson, Robert Clifford
Mayo Clinic Multidisciplinary Simulation Center

Workshop Abstract:
In this session participants will explore ways to enhance the realism of simulation by incorporating props, tips, and tricks into the learning experience. We will use our Respiratory Therapy background and simulation experience to show how to simulate many ventilation and hemodynamic scenarios in the ICU. Also a few moulage tips that work.

Description of workshop topic and rationale for importance
In this session participants will explore ways to enhance the realism of simulation by incorporating props, tips, and tricks into the learning experience. We will use our Respiratory Therapy background and simulation experience to show how to simulate ventilator and hemodynamic scenarios in the ICU. We will also include a few quick moulage tips and tricks.

Learning objectives

1. Attendants will be able discuss ways to build their own resources and lists.
2. Attendants will witness techniques used in placing a pulmonary artery catheter using METI HPS.
3. Attendants will become familiar with how to use Laerdal SimMan/Airman in several ventilator simulations.
4. Attendants will become familiar with how to use available medical equipment to aide in simulation.
5. Attendants will participate in a variety of hands on moulage tips and tricks.

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 11
Time: Monday January 15 3:00
Location: Nutcracker 2 **Size:** up to150

The New Face Of Multidisciplinary Team Training: Strategies To Incorporate Simulation-Based Training In Undergraduate, Graduate And Continuing Education Curricula.
Kimberly Yaeger[1], Julie Arafeh[1], Ann Johannessen[2], KT Waxman[3]
[1]Stanford University, Palo Alto, CA,[2]Philips Medical,[3]California Institute for Nursing and Health Care

Workshop Abstract:
With over 500 U.S. simulation centers, the time has come to integrate simulation-based training into educational curricula at all levels of healthcare education. This workshop covers three educational levels (graduate, undergraduate, and post-graduate) with concrete strategies to incorporate simulation-based training giving consideration to curriculum gaps, resources, team training, and initiating culture change. Prior work focused on validation and development of simulation-based training, less attention has been devoted to incorporation and implementation of curricula.

Description of workshop topic and rationale for importance
Given the fact that there are now over 500 simulation centers in the United States alone, and the recent rise in popularity of this methodology, the time has come to fully integrate simulation-based training into educational curricula at all levels of healthcare education. This workshop will discuss three areas of education (graduate, undergraduate, and continuing education) with concrete strategies to incorporate simulation-based training giving special consideration to current gaps in curriculum, resource sharing, the importance of multidisciplinary team training, and initiating culture change. While the bulk of the work has been focused on the validation of this methodology as well as development of simulation-based training programs, less attention has been devoted to incorporation and implementation of curricula on a broad scale.

Learning objectives
1.Identify areas in existing curriculum where simulation-based training is the ideal methodology in undergraduate, graduate, and continuing education.
2.Recognize the importance of multidisciplinary team training in all aspects of education.
3.Discuss mechanisms to achieve culture change and buy in in both healthcare and educational institutions.

COI Disclosure Statement.
Ann Johannessen is a Clinical Specialist with Philips Medical; all remaining have no COI to disclose.

Workshop # 12
Time: Monday January 15 3:00 pm
Location: Nutcracker 3 **Size:** up to 50

Simulation For Multi-Professional Outcomes-Based Clinical Skills Assessment.
Ross J. Scalese, M.D.[1], Vivian T. Obeso, M.D.[1], Geoffrey T. Miller, EMT-P[1], Jay K. Ober, MS, ARNP, BC[2]
[1]University of Miami School of Medicine, Center for Research in Medical Education, Miami, FL,[2]University of Miami School of Nursing, International Academy for Clinical Simulation and Research, Miami, FL

Workshop Abstract:
Assessment of professional skills is an essential step toward improving patient safety and assuring the public that their healthcare providers are competent. Simulation technology offers advantages for standardizing evaluations and testing a wide range of clinical (especially procedural) skills. This workshop addresses the rationale for using simulations in performance-based assessment, as well as the strengths/potential challenges inherent in these methods participants test with a simulator, analyze scoring instruments, and implement strategies to enhance simulation-based assessment.

Description of workshop topic and rationale for importance
Determining the most appropriate outcomes assessment instrument for particular skills that trainees should acquire is a common challenge for healthcare educators and evaluators. In the past, it has been customary to rely on actual patients for assessment of many clinical competencies. More recently, however, increasing awareness of patient safety and other ethical issues has appropriately limited the use of real patients as evaluation "tools"; routine assessment of learners' ability to perform critical or sensitive tasks on real (even standardized) patients is no longer acceptable. Use of patient substitutes, such as cadavers or animal models, raises its own ethical concerns, and faces the additional challenges of availability, cost, and maintaining adequate clinical realism. In addition, issues of reliability and standardization become important, especially in high-stakes examination settings. Using simulators circumvents most of these obstacles, and consequently these technologies recently have come into widespread use for clinical skills evaluation and assessment of competence across multiple healthcare professions.

Learning objectives

1. Describe rationale and best evidence for simulator-based outcomes assessment.
2. Review range of available simulators for evaluation of clinical competencies.
3. Discuss psychometric and other considerations in choosing/implementing simulator-based ssessment methods.
4. Outline framework for development of assessment instruments to use in simulator-based evaluations.

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 13
Time: Monday January 15 3:00
Location: Fantasia M **Size:** up to 65

Shared Simulator Case Libraries.
Howard Schwid
University of Washington, Seattle, Washington

Workshop Abstract:
Simulator case scenarios should be shared among collaborating contributors and institutions. In this workshop participants will learn to use the case authoring system already applied by 60 case contributors at 50 institutions to build 150 cases. Workshop participants will suggest new cases to add to the library and discuss advantages and barriers to sharing cases. Workshop participants will leave the workshop with the knowledge necessary to join the consortium of case contributors, thus gaining access to the full case library.

Description of workshop topic and rationale for importance

Sharing simulator case scenarios among institutions provides a more diverse learning experience for students, decreases the overall workload for educators, and provides a means for case developers to achieve academic recognition for their efforts .In this workshop we describe the standardized case authoring system we use to facilitate case development and sharing among multiple simulation centers. Over the last two years we have been working with about 60 case contributors at 50 institutions to develop simulator case libraries for multiple medical specialties. The following table summarizes the current state of the case libraries.

The case authoring system sets a standard approach for case development. The case developer first writes the learning objectives for the case, then designs the scenario based on finite state machine structure. The authoring system provides a framework for scripting the scenario by setting the properties for the states and transitions .The authoring system also guides the implementation of intelligent help, plus automated debriefing and scoring for the simulated case.

The cases are shared freely among the contributors and their institutions. Thus, developers that contribute a case or two will be able to use many.

Learning objectives

1. Be familiar with the shared simulator case libraries for ACLS, PALS, and neonatal resuscitation; adult and pediatric critical care and emergency medicine, obstetrics and anesthesia.

2. Understand how to use a case authoring system to build simulator case libraries, including:

    a. Learning objectives

    b. Case scenario based on simple models and scripting

    c. Suggested management

    d. Intelligent help during the case -"what next" help

    e. Automated debriefing and scoring

3. Be familiar with the current case libraries and understand how to collaborate among individual contributors and institutions to share case libraries for multiple medical specialties.

COI Disclosure Statement.
The author is a consultant for Anesoft Corporation. Anesoft Corporation provides financial support for the development of the simulation software, the case authoring system, and the case libraries described in the workshop.

Workshop # 14
Time: Monday January 15 3:00
Location: Pastoral 2 **Size:** up to 65

Applying Basic Education Theory To Simulation–AKA A Rookie's Guide To Teaching With Simulation.
Jessie Nelson[1,2], Beth LaVelle[1]
[1]HealthPartners Simulation Center for Patient Safety at Metropolitan State University, St. Paul, MN,[2]Emergency Medicine Department, Regions Hospital, St. Paul, MN

Workshop Abstract:
What makes simulation-based learning successful. The quality of the instructional design is far more important than the technology involved. Yet, few health care educators have extensive formal training in instructional design. In this fun, interactive workshop, participants will learn a systematic approach to creating instructional modules that can be applied to simulation-based education. The ideal participants are those who are new to simulation or are looking for ways to incorporate simulation appropriately into their teaching.

Description of workshop topic and rationale for importance

Creative instructors can use simulation technology with varying degrees of fidelity to teach clinical knowledge, psychomotor abilities and non-technical skills to many different learners. Newcomers to the field tend to put more focus on learning the intricacies of the simulators than developing the instructors. In reality, simulation is merely a tool in an educator's armamentarium.

This workshop is for people who are new to simulation or have not studied educational theory in depth. We will discuss the basics of instructional design and experiential learning theory, and how they apply to simulation.

1. A simulation program consists of much more than a simulator.
2. The instructors are more important than the simulators.
3. You don't need a simulator to do a simulation.
4. This is all about learning from experience; we just engineer the experience.
5. Don't use simulation just because you can.
6. Think about the education first, not the simulation.
7. Keep it simple. Teach to the objectives.
8. The debriefing is more important than the simulation.
9. Design educational sessions around the content, not around the simulation technology.

Learning objectives

1. Describe the basic components of instructional design.
2. Distinguish behavioral and non-behavioral objectives.
3. Write a behavioral objective.
4. Develop a basic simulation-based teaching module utilizing principles of instructional systems design.

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 15
Time: Tuesday January 16 10:30 am
Location: Nutcracker 1 **Size:** up to 150

"Where Am I… What Am I Supposed To Do …How Should I Act" Setting Rules And Expectations For A Successful Simulation Session.

Daniel B. Raemer, PhD[1,2], Jenny W. Rudolph, PhD[3], Robert Simon, EdD[1,2]
[1]Harvard Medical School,[2]Massachusetts General Hospital,[3]Boston University School of Public Health

Workshop Abstract:
Because provider-patient encounters are different in simulation than they are clinically, it is essential to establish expectations and rules of conduct to ensure a successful simulation session. Often, instructors don't adequately develop clear expectations which may lead participants to be confused and defensive. This session will provide techniques to ensure that an optimal learning environment is created so that participants understand educational expectations and how they're supposed to act during scenarios and debriefings.

Description of workshop topic and rationale for importance
Because provider-patient encounters are different in simulation than they are clinically, it is essential to establish expectations and rules of conduct to ensure a successful simulation session. Often, instructors don't adequately develop clear expectations which may lead participants to be confused and defensive. This session will provide techniques to ensure that an optimal learning environment is created so that participants understand educational expectations and how they're supposed to act during scenarios and debriefings.

Learning objectives
1. Analyze, through experience and reflection, the costs and benefits of properly introducing the simulation environment.
2. Organize the components of a good introduction to the simulation environment.
3. Implement an improved educational process at their home institution.

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 16
Time: Tuesday January 16 10:30 am
Location: Nutcracker 2 **Size:** up to 150
This is a SSH sponsored workshop

Developing Simulation-Based Disaster And Terrorism Training For Healthcare Professionals.
Geoffrey Miller, EMT-P[1], Paul Maniscalco, EMT-P[2], Hank Christen, EMT-P[3]
[1]University of Miami Miller School of Medicine,[2]The George Washington University,[3]Pensacola Junior College

Workshop Abstract:
Medical education boards and federal agencies such as the Department of Homeland Security have strongly recommended the implementation of" all-hazards" preparedness training into primary education of most healthcare professionals. Many of the defined competencies address awareness level objectives and are easily accomplished the vast majority of healthcare providers, however, will need to function at an operations level in the event of a major disaster or terrorist incident. This workshop will present innovative methods for implementing and integrating simulation-based" all-hazards" disaster response training into medical and healthcare educational programs.

Description of workshop topic and rationale for importance
Medical education boards and federal agencies such as the Department of Homeland Security have strongly recommended the implementation of" all-hazards" preparedness training into primary education of most healthcare professionals. For the most part, core competencies have been identified for a wide range of healthcare providers. While much of this training is accomplished through post-secondary training programs and courses, a great deal of the material can be integrated into existing primary education training programs. Many of the defined competencies address awareness level objectives and are easily accomplished; the vast majority of healthcare providers, however, will need to function at an operations level in the event of a major disaster or terrorist incident. This workshop will present innovative methods for implementing and integrating simulation-based" all-hazards" disaster response training into medical and healthcare educational programs.

Learning objectives
1. Discuss the benefits of implementing simulation-based disaster and terrorism response training into existing curricular frameworks.
2. Identify core competencies and key objectives for all healthcare disciplines related to disaster and terrorism response.
3. Describe strategies to integrate new methods and simulation-based instructional tools into existing curricular frameworks.
4. Provide examples of simulation-based disaster and terrorism response training.

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 17
Time: Tuesday January 16 10:30 am
Location: Nutcracker 3 **Size:** up to 50

Bringing Crisis Resource Management Principles To Life.
Peter Dieckmann, Marcus Rall
Center for Patient Safety and Simulation–TuPASS, Department of Anaesthesiology and Intensive Care Medicine, University Hospital Tuebingen, Tuebingen University Medical School, Tuebingen, Germany,

Workshop Abstract:
Crisis Resource Management (CRM) helps improving patient safety. The newly revised 15 CRM principles aid to prevent and manage critical incidents (Rall & Gaba, 2005). However, applying, recognizing, and discussing these principles during scenarios and debriefings is not easy. In this workshop participants will do hands-on exercises, "bringing CRM to life". Such exercises and metaphors can be used throughout simulator-based courses. They also help understanding and applying CRM.

Description of workshop topic and rationale for importance
Application of Crisis Resource Management principles during simulator-based courses and during scenarios and debriefings. Exercises that help understanding and applying CRM principles. The CRM principles are easy to read, but hard to really grasp, understand and use. Often CRM is only touched upon superficially. There are descriptions of good or bad examples, but often no real analyses of the "hows and whys". Participants do get little support to apply CRM. Practical exercises allow for further developing the actual application of CRM during scenarios and debriefings.

Learning objectives
1. Understand the scope and meaning of CRM principles better.
2. See the need to work more with CRM.
3. Able to replicate the exercises during his own simulator-based courses.

COI Disclosure Statement.
PD and MR are involved in instructor courses and meetings that are sponsored partly or fully by Laerdal Medical, Puchheim, Germany, Laerdal International, Stavanger, Norway, and SimuLearn Bologna. Laerdal or SimuLearn sometimes paid lecture fees to PD and MR for contributions on sponsored meetings or fees for conducting simulator instructor courses. Neither MR or PD receive royalties. In the view of the authors there is no relevant influence on our scientific attitudes and views due to the collaborative work with Laerdal and SimuLearn.

Workshop #18
Time: Tuesday January 16 10:30 am
Location: Fantasia M **Size:** up to 50
This is a SSH sponsored workshop

Combining Standardized Patients, Virtual Patients, and High-Fidelity Simulated Patients: A Promising Educational Synergy?
Grace Huang[1],James Gordon[2], Michele Pugnaire[3]
[1]Beth Israel Deaconess & Harvard Medical School,[2]Gilbert Program in Medical Simulation, Harvard Medical School,[3]University of Massachusetts Medical School

Abstract
In this interactive workshop, participants will explore the opportunities that multi-modality simulation affords in achieving a broader spectrum of learners and learning objectives. They will detail the advantages and disadvantages of standardized patients, virtual patients, and human patient simulation as standalone educational tools. They will consider the educational theories that may underlie the effective use of multiple types of simulation. They will propose curricular scenarios whereby two or more types of simulation are used to address a clinical topic. Finally, presenters will probe the audience's interest in preparing a white paper on multi-modality simulation. The ultimate goal of the workshop is to spur ideas and initiatives for using multiple types of simulation synergistically at participants' own institutions.
Description/Rationale:
Standardized patients (SPs), virtual patient (VP, screen-based) simulation, and high-fidelity simulation (HPS) represent effective stand-alone educational tools. Although all types can be applied across the continuum of medical education and in any clinical topic, each has its distinct advantages and disadvantages that may favor its use for particular types of learners and particular topics. SPs offer the highest form of human fidelity in education and assessment but require considerable resources to train and hire. Their use predominates in undergraduate medical education for high-stakes testing in data-gathering and communication skills assessment. VPs allow ease of access and scalability but are resource-intensive to develop and have limited fidelity in the psychomotor and affective domains. They tend to be used for medical students and in continuing medical education for cognitive learning. HPS provide opportunities to replicate complete clinical environments but require significant start-up investment costs and maintenance personnel. For institutions considering centralizing their simulation efforts or integrating simulation throughout the curriculum, a single type of simulation may not be sufficient to meet the spectrum of diverse learners or curricular goals. Using two or more simulation types together may form a potent synergy that crosses

domains in various educational models. One example would be the use of VPs to achieve cognitive learning objectives combined with using SPs to achieve affective learning objectives. Another example would be pairing VPs and HPS, the former to address basic concepts prior to using the latter to apply those concepts in a novel setting.

Learning Objectives:

1. To have participants define specific advantages and disadvantages to each of the three types of medical simulation, in terms of content areas, resource requirements, and pedagogic uses
2. To have participants identify advantages to using SPs with HPS, to using VPs with HPS, and SPs, VPs, and HPS together
3. To have participants consider topics or create scenarios in which two or more of the simulation types are used together
4. To garner interest and commitment from volunteers to create a "white paper" on multi-modality simulation

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 19
Time: Tuesday January 16 1:00 pm
Location: Nutcracker 1 **Size:** up to 150

Incorporating Multidisciplinary Team Training in a Simulation Curriculum.

Yue Ming Huang[1], Randolph Steadman[1], Victor Duval[1], Rima Matevosian[3], Erik Dutson[2], Soo Hwa Han[2], Cecilia Canales[1]
[1]Department of Anesthesiology, David Geffen School of Medicine at UCLA, Los Angeles, CA,[2]Department of Surgery, David Geffen School of Medicine at UCLA, Los Angeles, CA, [3] Department of Anesthesiology, Olive View-UCLA Medical Center, Sylmar CA

Workshop Abstract:

Multidisciplinary team training is increasingly recognized as an important aspect of medical education. Communication breakdowns that impact the quality of patient care can be addressed via simulation. This workshop will provide a model for multidisciplinary simulation training. Following a simulated event, we will discuss debriefing tips, scenario application and ideas for incorporating team training into a simulation curriculum.

Description of workshop topic and rationale for importance

Multidisciplinary teams are the foundation of health care delivery. However, team interactions are frequently suboptimal. A recent study identified 129 communication failures out of 421 communication events in a 90-hour observation (Lingard, 2004). Moreover, the Joint Commission on Accreditation of Health Care Organization has identified failures in communication as the number one root cause of sentinel events between 1995 and 2005. Recommended components of quality health care delivery include team training, effective communication across disciplines, and a culture that fosters open communication (JAHCO, 2005).

Simulation provides unique opportunities for deliberate practice that can be incorporated into educational curricula to improve specific skills. Recent studies have shown that simulation significantly improves team performance (DeVita, 2005; Shapiro, 2004).However, coordinating team training can be challenging. Our workshop will demonstrate a multidisciplinary team training session. The audience will then identify practical ways to incorporate team training into their curriculum.

Learning objectives

1. Establish the essential elements of a team training scenario
2. Determine key resources necessary for team training simulation
3. Develop evaluation tools for measuring team interaction
4. Identify barriers to implementation of team training in educational programs

No significant financial relationships with commercial entities were disclosed by all authors

Workshop #20
Time: Tuesday January 16 1:00 pm
Location: Nutcracker 2 **Size:** up to 50

Introduction to Instrument Validity: "Better Practices for Evaluating Communication Skills".

Lisa Howley
University of North Carolina at Charlotte

Workshop Abstract:

This workshop will provide the attendees with an introduction to validity as it relates to instrument development and use. Based on evidence from general and medical education literature, specific user-friendly methods for increasing the validity of a newly developed instrument will be discussed and applied.

Description of workshop topic and rationale for importance

This workshop will provide the attendees with an introduction to validity as it relates to instrument development and use. Based on evidence from general and medical education literature, specific user-friendly methods for increasing the validity of a newly developed instrument will be discussed and applied.

Evaluating the communication skills of medical and allied health students is a critical component of simulation methodologies. Unfortunately, evaluation instruments are often developed and administered informally and without attention to sound educational or psychometric practices.

Learning objectives

1. Identify the most common communication evaluation tools used by standardized patient and simulation programs
2. Describe the meaning and importance of measurement validity & explain research-based methods for gathering evidences to support the validity of inferences made from measures
3. Understand one method for gathering content-related evidence of validity by becoming an active participant in a validation exercise

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 21
Time: Tuesday January 16 1:00 pm
Location: Nutcracker 3 **Size:** up to 150

They Don't All Code - Using High-Fidelity Simulation To Train Rapid Response Teams..
Jessie Nelson, Beth LaVelle
HealthPartners Simulation Center for Patient Safety at Metropolitan State University, St. Paul, MN

Workshop Abstract:
This workshop is designed for staff implementing Rapid Response Teams (RRT) in hospitals or simulation specialists involved in simulating such scenarios. We will discuss how simulation is used to recreate critical and non-critical situations and troubleshoot new hospital policies and procedures. Basic issues which are often not considered during implementation of procedures are emphasized. We will brainstorm about several typical RRT scenarios, share lessons learned and distribute information gathered to participants after the session.

Description of workshop topic and rationale for importance
Hospitals across the world are developing Rapid Response Teams (RRT), or Medical Emergency Teams, in order to bring practitioners with critical care experience to the general care patient who is deteriorating. These hospitals are all facing the same issues–staff comfort with independent assessments and recommendations, negotiating between team members, dealing with unfamiliar and undifferentiated patient complaints, communicating with patients and families during crises, development of documentation tools, managing workflow during RRT calls, implementing SBAR (situation-background-assessment-recommendation) communication.
This workshop will share the curriculum and lessons learned from a RRT project that was a collaborative effort between the Institute for Healthcare Improvement, the Institute for Clinical Systems Improvement, the Minnesota Hospital Association (RRT Action Group), the Health Partners Simulation Center for Patient Safety at Metropolitan State University staff and RRTs from across Minnesota. Many hospitals use simulation for training related to critically ill or arrested patients. However, most RRT calls involve patients who talk, are not nearly as ill, have more extensive charts/documentation, and often have family members present. This presents unique challenges to RRT members, instructors, and simulation faculty, so we developed a library of simulated adult and pediatric cases with varying levels of clinical difficulty as well as many non-clinical (cultural, legal, and ethical) issues and customized every workshop to meet the needs of the participating hospital. Using high-fidelity simulation offers a safe, effective, and efficient method to plan, train, and troubleshoot Rapid Response Teams. This strategy can be applied to other hospital initiatives such as redesigning rooms, trialing new equipment, testing workflows, or implementing electronic medical records. Ideal participants are hospital educators who are starting rapid response teams or simulation educators and technicians who are looking for ways to simulate general care scenarios.

Learning objectives Describe how to develop a multi-hospital collaborative for implementing new patient care initiatives, such as Rapid Response Teams

1. Propose a method of using simulation to assess and troubleshoot hospital systems or processes prior to implementation.
2. Compare and contrast high-fidelity simulations of general care and intensive care situations.
   Develop a typical Rapid Response Team scenario.

No significant financial relationships with commercial entities were disclosed by all authors
Workshop # 22
Time: Tuesday January 16 1:00 pm
Location: Fantasia M **Size:** up to 50

Two Standardized Patients (SPs) in the Same Clinical Scenario: The Intricacies of Organizing Triadic Encounters.
Elizabeth Kachur[1], Lisa Altshuler[2], Erik Langenau[2], Anne Dembitzer[3], Karen Adamo-Henry[3], Sondra Zabar[4]
[1]Medical Education Development, New York, New York,[2]Maimonides Medical Center, Brooklyn, New York,[3]CUNY - Sophie Davis School of Biomedical Education,[4]New York University

Workshop Abstract:
This workshop addresses the opportunities and challenges of developing and implementing standardized scenarios (e.g., OSCE stations) that include more than one person as “stimulus” (e.g., a non-English speaking patient and an interpreter).Experiences from three institutions will be shared. Participants will have the opportunity to practice script writing and receive feedback from workshop faculty and other participants. Rating issues will also be discussed.

Description of workshop topic and rationale for importance
Standardized Patients (SPs) are now widely used in health professions education. Typically participants in Objective Structured Clinical Exams (OSCE) or similar exercises encounter one SP per station or scenario. However, in real life, there are many clinical situations when a trainee has to deal with more than one person at a time. The most commonly these may be parent/child pairs. In Pediatrics it is the parent who does most of the talking while in Geriatrics the roles may be reversed. There are also many scenarios when couples or families become involved (e.g., giving bad news, Do Not Resuscitate orders, family therapy interventions).If the relative is replaced with a hired caregiver (e.g., a home health aid) different dynamics will emerge. The same is true when dealing with other professionals (e.g., an interpreter, a nurse) in addition to the patient. Triadic encounters can also occur In Objective Structured Teaching Exams or Exercises (OSTEs), when one may want to create a small groups of learners (e.g., rounds, mini-lectures).Here one may want to employ multiple Standardized Learners (SLs).In all those cases the encounter format will not be dyadic but involve more than two standardized stimuli. Consequently one will have to also control the interactions the two individuals have with each other.
For educators (e.g., OSCE organizers) triadic encounters presents special challenges such as the need for additional staff, SPs who can work together (e.g., have the same language skills), expanded SP instructions that offer details about how the two SPs need to react to each other in addition to the trainee (e.g., emotional tone and timing must also be coordinated).Triadic encounters in OSCE stations also offer unique opportunities. They can increase the level of difficulty, uniquely assess the management of complex dynamics (e.g., dealing with a couple that is not in agreement about a specific treatment approach), and allow for pairing up a less well performing SP with one who is performing excellently in order to maintain adequate quality standards. As medical education is become more sophisticated, we need to gain more expertise in managing OSCE stations and other programs that involve more than one standardized stimulus.
Learning objectives
1. Describe scenarios that feature more than one SP at a time
2. Identify SP characteristics that make them good or poor candidates for working in such complex stations
3. Discuss script writing and training strategies
4. Elaborate on trainee performance rating issues

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 23
Time: Tuesday January 16 3:00 pm
Location: Nutcracker 1 **Size:** up to 50

Using Simulation To Teach And Assess Core Competencies In Professional Education.
Alice Edler[1], Ruth Fanning[2]
[1]Department of anesthesia, Stanford University Medical School
[2]Department of anesthesia, Stanford University Medical School

Workshop Abstract:
The ACGME have generated a set of core competencies aiming to transform the medical curriculum from a laundry list of lecture topics to a comprehensive program of the humanistic practice of medicine, and explicitly require the teaching and evaluation of these competencies within the next five years. In this workshop we aim to explore in a practical hands-on fashion how various teaching an assessment techniques may be used in conjunction with simulation to achieve these objectives.

Description of workshop topic and rationale for importance

The ACGME (Accreditation Council for Graduate Medical Education)-generated core competencies have transformed the medical curriculum from a laundry list of lecture topics to a comprehensive description of the humanistic practice of medicine, including not only knowledge, but also critical skills and behaviors. In the rapidly evolving world of medical knowledge it is necessary to be a life long learner (practice based learning and improvement) and to make appropriate decisions regarding the allocation of medical, financial, and institutional resources in patient care (systems based medicine). In the past teaching these skills was left to indirect modeling and rarely assessed in any organized fashion. The new ACGME competencies require explicit teaching and evaluation of these competencies within the next 5 years but the onus of designing instructional and assessment tools rests primarily on the individual institutions. More and more Educators are realizing that single modality; chalk and talk teaching, matched with pen and pencil assessment, inadequately and unreliably assesses a student's performance in these varied yet essential domains. Simulation of various modalities appears well suited to teaching and assessing core competencies. Standardized patients provide opportunities for teaching and learning combination skills over time without the risk of breech of confidentiality; virtual reality scenarios encourage role-play and participation in both an individual and team setting. High fidelity patient simulation allows educators to assess both technical and team work skills such as communication, mutual respect and professional behaviors in a variety of taxing medical situations. In this workshop we aim to examine the core competencies of medical education, and explore how various teaching and assessment techniques may be used in conjunction with simulation to achieve these objectives.

Learning objectives

1. Familiarization of participants with the goals and objectives of the ACGME Outcomes Project including definition of core competencies and the time line for implementation in undergraduate and graduate medical education.
2. Provision of examples of various simulation teaching techniques currently used for teaching and assessing communication, practice based learning and system based medicine in graduate medical education.
3. Introduction to the key principles needed in valid and reliable assessment.
4. Introduction of commonly used authentic educational assessment tools to participants through facilitated small group activities with including:

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 24
Time: Tuesday January 16 3:00 pm
Location: Nutcracker 2 **Size:** up to 50

Setting Performance Standards for Simulation-Based Exercises.
John (Jack) Boulet[1,2], David Murray[3]
[1]Foundation for Advancement of International Medical Education and Research, Philadelphia, PA, [2]Educational Commission for Foreign Medical Graduates, Philadelphia, PA, [3]Washington University School of Medicine, St. Louis, MO

Workshop Abstract:
As mannequin-based simulation becomes more popular, and is incorporated in more summative assessments, there will be a need to set appropriate performance standards. Regrettably, while standard setting techniques are well-developed for selected-response examinations (e.g., multiple choice), relatively little work has been done in the performance assessment domain, especially with respect to mannequin-based assessment scenarios. By employing some of the techniques used to set cut-points for standardized patient assessments, it will be possible to derive appropriate standards for mannequin-based simulations.

Description of workshop topic and rationale for importance
With the recent adoption of high-stakes performance-based assessments in medicine, including those used for certification and licensure, there has been a need to modify existing standard setting methodologies, including developing new techniques that can reliably delimit the point, or points, which separates adequate from inadequate performance. For mannequin-based simulations to be effectively used for summative decisions (e.g., certification, graduation, promotion), setting defensible performance standards is paramount.
In general, standard setting techniques can be classified and norm- and criterion-referenced. For norm-referenced methods, a point on the score scale is chosen so as to fail (or pass) a certain percentage of the candidates. For summative assessments, where one wants to know what a candidate can and cannot do, norm-referenced techniques are not appropriate. For criterion-referenced techniques, either a test- or examinee-centered approach can be used. For test centered approaches, the standard setting panelists make judgments based on the scoring tools. For example, if a checklist is used for scoring, the panelists would decide how many items need to be obtained for a candidate to be judged to be competent (or minimally proficient, etc.). Unfortunately, these types of judgments can be difficult and, because of various opinions regarding the importance of certain actions, there is often only marginal agreement among panelists. Alternatively, examinee-centered approached can be employed. Here, performance samples (e.g., videotapes) are shown to the panelists (without the scores) and they are asked to make summary judgments (e.g., adequate, inadequate) for each. Then, the panelists' judgments are regressed onto the actual scores to delimit the score point that maximally discriminates between adequate and inadequate performance. This technique has been shown to yield valid and defensible standards for high-stakes SP-based assessments and should also be appropriate for mannequin-based examinations.

Learning objectives

1. Choose an appropriate standard setting methodology for his/her particular needs
2. Design a basic standard setting study
3. Understand and evaluate the process of setting standards for performance-based assessments

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 25
Time: Tuesday January 16 3:00 pm
Location: Nutcracker 3 **Size:** up to 150

A Perioperative Complication: Incorporating Interesting Ethical Dilemmas Into Scenarios.
David B. Waisel, MD[1,2], Robert Simon, EdD[1,3], Daniel B. Raemer, PhD[1,3]
[1]Harvard Medical School,[2]Children's Hospital Boston,[3]Massachusetts General Hospital

Workshop Abstract:
The Center for Medical Simulation brought together developers from anesthesia, intensive care, organizational behavior, ethics, and education to create an ethical dilemma that thrusts participants into high stakes decision making in a time-stressed environment. The scenario uses patient simulation and a standardized patient. Participants will (1) take part in the simulation (2) join a discussion that demonstrates debriefing an ethical dilemma and (3) help construct parameters to create other interesting ethical problems in simulation.

Description of workshop topic and rationale for importance
The Center for Medical Simulation brought together developers from anesthesia, intensive care, organizational behavior, ethics, and education to create an ethical dilemma that thrusts participants into high stakes decision making in a time-stressed environment. The scenario uses patient simulation and a standardized patient. Participants will (1) take part in the simulation; (2) join a discussion that demonstrates debriefing an ethical dilemma and (3) help construct parameters to create other interesting ethical problems in simulation.

Learning objectives

1. Understand the clinical considerations and behavioral components of a scenario that highlight an ethical issue.
2. Understand an approach to debriefing scenarios with that highlight an ethical issue.
3. Develop a home-based scenario based on guidelines and understandings from the workshop.

No significant financial relationships with commercial entities were disclosed by all authors

Workshop # 26
Time: Tuesday January 16 3:00 pm
Location: Fantasia M **Size:** up to 50

Determining Instructional Needs, Goals and Objectives.
Pamela Andreatta, Steve Kasten
University of Michigan Medical School, Ann Arbor, MI

Workshop Abstract:
Participants will learn how to prepare instructional needs assessment questions, establish instructional intent using goal statements, and prepare specific instructional learning objectives that include conditions and standards of performance. Upon completion, participants will have a model upon which to base other instructional projects. Timeframe: 90 minutes. Max. Participants: 50 COI: This workshop will not focus on any particular simulator. All workshop faculty declare no conflict of interest with the content presented in this workshop.

Description of Workshop and Rationale for Importance

This workshop will provide a model upon which to develop an instructional needs assessment, conduct goal analyses, and write instructional objectives for 3 domains of learning for use in designing a simulation-based program of instruction that provides measurable evidence of effectiveness. The participants shall gain a broad understanding of the process model for connecting measurable learning objectives to instructional needs. Simulation-based instruction is relatively costly because it requires additional materials, facilities, and personnel, while removing healthcare providers from the clinical context. Additionally, there is particular interest associated with the use of simulation in healthcare for the assessment of knowledge, skills, and affective dimensions, and for certification of competency in those areas. All of these factors contribute to the question of verifying the effectiveness of simulation-based instruction. To answer that question affirmatively, it is critical to design instruction such that the associated performance outcomes are directly applicable to the clinical context. It is essential to comprehensively determine what the instructional needs of the clinical context are, establish the intent of the instruction, and specifically define what performance outcomes are required for the instructional needs to be met.

Learning objectives

1. Given the 6 Categories of Needs Assessment Questions, identify which of the questions are most pertinent to an identified problem, and explain why to peers in a small group.
2. Be able to critique the contributions of peers by offering content-based suggestions.
3. Given an identified instructional need, write an instructional goal statement associated with the instructional need, and explain it to peers in a small group.
4. Be able to critique the contributions of peers by offering content-based suggestions.
5. Given an instructional goal statement, write an instructional objective that includes performance, conditions, criterion, and any indicator behaviors, and explain it to peers in a small group. Be able to critique the contributions of peers by offering content-based suggestions.
6. Given an instructional objective identify the domain of learning it addresses, and explain it to peers in a small group.
7. Be able to critique the contributions of peers by offering content-based suggestions.

No significant financial relationships with commercial entities were disclosed by all authors

Appendix 2

Research Abstracts Presented and subsequently published in Vol 2#1, Simulation in Healthcare

Research Abstract : 62

Effect Of Cardinal Movements On Fetal Mechanical Response During Simulated Shoulder Dystocia Deliveries.

Robert Allen[1], Tara Johnson[1], Vanessa Lapointe[1], Edith Gurewitsch[1,2]
[1]Biomedical Engineering, Johns Hopkins University, Baltimore, Maryland, [2]Gynecology/Obstetrics, Johns Hopkins University, Baltimore, Maryland

OBJECTIVE: In simulated shoulder dystocia deliveries, we sought to compare neck extension (NE), head rotation (HR), lateral deviation (LD), and anterior and posterior brachial plexus strain (BPS) between descent and expulsion.

STUDY DESIGN: Using a biofidelic instrumented fetal model, a maternal model, and a data acquisition system, we performed 20 ROA deliveries. We recorded data continuously for each trial and compared the maximum values for each parameter: NE, HR, LD, and anterior and posterior BPS. We compared values throughout two time periods preceding and following impaction of the anterior shoulder behind the pubic symphysis: descent (engagement, descent, flexion, and internal rotation) and expulsion (extension and external rotation). We used the Student's t-test for data analysis, with two-tailed $p<0.05$ considered significant

RESULTS: As shown in the table, NE and posterior BPS are significantly larger for expulsion. HR, LD, and anterior BPS are significantly greater during descent.

CONCLUSION: The fetus undergoes quantifiable mechanical stress during descent and during expulsion.

Fetal Mechanical Response

	Descent	Expulsion	*p*-value
Neck Extension (mm)	0.0±0.0	1.2±1.6	0.003
Head Rotation (°)	65.6±12.8	51.8±24.9	0.049
Lateral Deviation (°)	65.2±13.6	39.3±19.6	<0.001
Anterior BP Strain (%)	14.2±1.5	10.4±3.8	<0.001
Posterior BP Strain (%)	0.4±1.6	3.7±3.2	<0.001

COI statement: None

Research Abstract : 57

Teaching Chest Tube Insertion in Postgraduate Emergency Medicine Training - Evaluation of Three Different Models.

Ammann Andreas[1], Zürcher Mathias[1], Gambazzi Franco[2], Ummenhofer Wolfgang[1]
[1]Department of Anaesthesia, University Hospital, Basel, Switzerland, [2]Department of Thoracic Surgery, University Hospital, Basel, Switzerland

Background: Chest tube insertion is a potentially lifesaving procedure and part of emergency medicine teaching courses. Ethical aspects as well as high costs using anesthetized animals, human cadavers or animal preparations as training models indicate the need for alternatives. ***Aim***: To evaluate the participants' satisfaction with the teaching sequence, the degree of reality and the impact on their future daily practice by using human cadavers, sheep preparation, or manikins. ***Methods***: Participants from eight courses over a three-year period were asked to complete a questionnaire after the chest tube skill station. Participants were asked about their personal and professional history and their experience with real chest tube insertion. Their overall acceptance of the model, degree of reality and the estimated impact they thought it would have on their future daily practice was graded using a six-step scale. *Teaching sequence*: Theoretical lecture and demonstration followed by a hands-on workshop with each participant performing at least one chest tube insertion under supervision. *Models*: Human cadavers, sheep preparation and manikins (SimMan®, Laerdal, Stavanger, Norway). *Statistics*: Mean and standard deviation for descriptive data; univariate ANOVA for comparison of the models that took into consideration previous experience. ***Results***: 144 participants, 141 completed questionnaires. There was high satisfaction for all three models; the human cadaver was rated highest for realism (Table); significant higher rating of impact on future daily practice for the human cadaver model for the well experienced participant subgroup: (mean): manikin (m): 2.43; sheep preparation (s): 3.56; human cadaver (h): 5.0, $p<0.05$ for m compared with h). ***Conclusions*:** All three models demonstrated very high satisfaction scores. Despite the higher degree of realism shown for the human cadaver model, we support the use of manikins or animal preparations due to ethical reasons. All three models have the potential for a positive impact on future daily practice.

Table

	Manikin (n = 63)	Sheep Preparation (n = 62)	Human Cadaver (n = 16)	p-value
Satisfaction	5.3±0.73	5.18±0.71	5.31±0.48	p=0.57
Realism	4.0±1.15	4.23±0.96	5.19±0.54	p<0.01
Impact on future daily practice	4.16±1.59	4.35±1.34	5.13±0.72	p<0.05

(mean ± SD)

COI statement: None

Research Abstract : 32

Simulation-based Training in Ultrasound Assisted Central Venous Catheterization.

Pamela Andreatta[1], Rajani Mangrulkar[2], Michael Marsh[1], Yifang Chen[3], Kyung Cho[3], Maureen Thompson[4]
[1]Department of Medical Education, University of Michigan Medical School, [2]Department of Internal Medicine, University of Michigan Medical School, [3]Department of Interventional Radiology, University of Michigan Medical School, [4]Office of Clinical Affairs, University of Michigan Health System

Background:

More than 5 million central venous catheters (CVCs) are inserted in the USA each year, and although these catheters can be life saving, they are also associated with significant risks; 75% of complications arising from procedures like CVC occur in the first 30 cases of a physician's career. A structured CVC training program9 and the use of ultrasound guidance for CVC placement, 7, 10, 11 increased patient safety by reducing complication rates. 8, 10-14 Simulation-based procedural trainers have demonstrated validity in transferring skills to applied clinical environments,1-6 and the use of simulators for CVC training is valuable because skills can be honed before attempting to perform the procedure on a live patient, thereby increasing patient safety.

Methods:

Fifty-four Internal Medicine Interns received training and were assessed through didactic and one-on-one instruction in Ultrasound-guided CVC procedures using Blue Phantom? vascular access simulation models. After individual instruction, subjects independently practiced placement procedures using Ultrasound machines and standard catheter kits using one or more of 4 types of models: leg, arm, and head/neck anatomical models and a simple block model. Six-point Likert scales were used to assess pre- and post-test procedural self-efficacy, CVC performance on head/neck models, perceived value of simulation-based training, and an open response for subjects to write down what they learned.

Results:

Mean subject score on the knowledge-based quiz was 91.68 / 100.00 (SD = 11.99). Subjects performed in the good to very good range for CVC performance (M=4.74, SD = .44). The small standard of deviation suggests that the training results were uniformly consistent. There were no significant differences between the type of practice model and CVC performance. There were no significant differences in CVC performance based on the number of previously placed CVCs, although prior placement ranged from zero to 35 (M = 4.33, SD = 4.97). This suggests that the instruction was effective independent of the experience level of the learner. Subjects indicated that after simulation-based training they were more confident in helping with CVC ($t = -9.25$, $p = .000$) and in performing CVC on their own ($t = -13.52$, $p = .000$). Subjects ranked the overall quality of instruction as very good (M = 5.25, SD = 0.17). More than half (57.4%) of the subjects made specific comments about what they learned during the training session, including specific mechanical techniques (83.87%), how to operate the equipment (67.74%), infection control techniques (38.71%), safety measures and contraindications (35.49%), associated complications (22.58%), specific anatomy (25.8%), and the advantages of practice (19.35%).

Conclusion:

The simulation-based training model that we employed using Ultrasound guidance and Blue Phantom? models for procedural training demonstrates that the integration of these components provides trainees with the tools they need to successfully demonstrate understanding and techniques associated with placing a CVC, and that the students perceived the training as effective. The logical next step is to assess the trainings effectiveness on the transfer of knowledge and skills to the clinical setting.

COI statement: None

Research Abstract : 56

The Use of Whole Procedure Simulations (WhoPS) in a Masters in Surgical Education Programme.

Fernando Bello, Roger Kneebone, Tanya Tierney, Debra Nestel, Ara Darzi
Department of Biosurgery and Surgical Technology, Imperial College London, London, UK

Background

This research explores the incorporation of *Whole Procedure Simulations* in a Masters in Surgical Education curriculum with the aim of giving students the opportunity to design, prepare and conduct a complex simulation-based scenario for procedural training.

Our group has developed the concept of WhoPS and has previously used it in undergraduate clinical skills training, nurse-led minor surgery, gastrointestinal endoscopy and national training programmes for new surgical roles within the workforce.

Using an innovative combination of inanimate simulators and Simulated Patients (SPs), WhoPS allow training and assessment of invasive clinical procedures on conscious patients. Learners carry out each procedure in a quasi-clinical scenario, where they have to interact with the 'patient' while performing the technical task. An authentic simulated clinical environment creates the illusion of reality. Expert observers use objective rating scales to provide a structured assessment of each performance. Communication skills are rated using a two-fold approach. The observer's perspective uses a framework of desired behaviours, while the *patient's* perspective draws on the SP's response while 'undergoing' the procedure.

Due to the increasing relevance of simulation in training and assessment, it is paramount that postgraduate programmes in education offer students both solid educational theory underpinning, as well as hands-on experience in the use of simulation techniques / technologies for teaching, training, learning, assessment and curriculum and session design. This paper reports our initial experience of introducing the design, planning, preparation and execution of a complex simulation-based scenario for procedural training into our Masters in Surgical Education programme.

Methods

A total of four groups of students (4 students each) where asked to design, plan, prepare and execute a flexible sigmoidoscopy WhoPS as their assessed coursework within the "Theory and practice of technology & simulation in surgery & education" module of our Masters programme. Presentations and hands-on sessions on simulation, simulators, educational perspective and WhoPS were held prior to commencement of the coursework, which was divided into four sessions: initial discussion, case selection and role (Learner, Simulated Patient, Observer, Coordinator) assignment; role discussion and training; planning and preparation; and WhoPS execution / debriefing.

Results

Each group summarised their experience in a presentation, sharing problems and possible solutions and discussing educational issues raised during their group work. A group report that included a table linking educational aspects, roles and relevant theories, summary report for each role, comments from each role produced after the WhoPS execution and comments from the group on dynamics and specification was also submitted. In spite initial reluctance and scepticism, feedback from students in the group presentations and reports was highly positive and will be detailed in the presentation.

Conclusions

The use of simulation in training and assessment requires both proper educational underpinning as well as practical understanding of simulation techniques / technologies. The holistic nature of WhoPS enables learners to gain significant experience in both.

COI statement: None

Research Abstract : 20

Management of simulated oxygen supply failure and expiratory valve malfunction: is there a curriculum gap?

Haim Berkenstadt[1,2,3], Tiberiu Ezri[1,3], Avner Sidi[1,3], Amitai Ziv[2,3]
[1]The Israeli Board Examination Committee in Anesthesiology, [2]The Israel Center for Medical Simulation (MSR), [3]Tel Aviv University, Sackler School of Medicine

BACKGROUND:
In a recent publication, deficits in the management of a simulated oxygen pipeline failure in a Canadian residency program were demonstrated using high fidelity simulation based training (1). Only half of 12 fourth year residents recognized oxygen pipeline failure and opened the oxygen cylinder on the machine. The alarming findings, which may compromise patient safety, led us to look for possible gaps among Israeli residents.

MATERIAL AND METHODS:
Two simulation based scenarios were developed and used during the Israeli Board Examination in Anesthesiology. In the first scenario performed by 10 examinees, oxygen pipeline failure, and in the second scenario performed by other 9 examinees expiratory valve malfunction occurred during simulated pediatric anesthesia scenarios. Performance was scored in real time by two anesthesiologists using a performance checklist independently.

RESULTS:
In the first scenario - 9 out of 10 examinees recognized the O2 supply and pressure alarms, successfully opened the O2 cylinder on the machine and disconnected the anesthesia machine from the central oxygen supply. However, only 6 of the examinees could fully explain how they can minimize the use of oxygen from the cylinder (using hand bag ventilation and not mechanical ventilation, using low flows, and adding air or nitrous oxide to oxygen). In the second scenario - 9 out of 9 participants recognized the abnormal capnographic signal and ventilated the patient using a self inflating bag, 8 out of 9 actually found the technical problem, however only 6 out of 9 offered the full differential diagnosis for the situation (**exhausted absorbent**, inadvertent administration of carbon dioxide, excessive dead space, leak in inspiratory limb of circle, capnograph artifact).

CONCLUSION:
Our results suggest that the management of oxygen supply failure and expiratory valve malfunction was satisfactory among experienced residents attending the Board Examination in Israel. However, deficiencies in understanding were manifested by the less then optimal differential diagnosis offered. Although our results are different from the Canadian ones, the process of using alarming information from one medical system to assess another medical system represents the value of sharing information and the value of simulation based performance assessment to improve patient safety.

References:

(1) Anesth Analg. 2006 Mar; 102(3):
865-7.

COI statement: None

Research Abstract : 21

Formative role of simulation-based objective structured clinical examination (OSCE) National Board Examination in Anesthesiology.

Haim Berkenstadt[1,2,3], Amitai Ziv[2,3], Tiberiu Ezri[1,3], Orit Rubin[2,4], Avner Sidi[1,3]
[1]The Israeli Board Examination Committee in Anesthesiology, [2]The Israel Center for Medical Simulation (MSR), Sheba Medical Center, Tel Hashomer, Israel, [3]Tel Aviv University Sackler School of Medicine, [4]The National Institute for Testing & Evaluation, Jerusalem, Israel

INTRODUCTION:
In the last four years simulation-based objective structured clinical examination (OSCE) was incorporated as part of the Anesthesiology Board Examination in Israel. Initially, two hands-on simulation-based examination stations (trauma management and resuscitation) were incorporated, followed by the incorporation of 3 more stations - operating room crisis management, mechanical ventilation and regional anesthesia. Following each of the examination periods (twice a year) a list of common mistakes performed during the examination was sent to all directors of the training programs in the country, and a similar list was sent to the examinees 1 month before the examination. The aim of the present study was to look at the formative value of the examination process, namely the influence of the process on mistakes performed during the various examination periods.

MATERIALS AND METHODS:
Although scenarios were changed from one examination period to another, generic tasks were allocated in the blueprints of the scenarios and the success rate in performance was compared between the different examination periods.

RESULTS:
The correct performance of various life support tasks such as treatment of unstable supraventricular tachycardia and the technique of chest drain insertion increased over the examination periods reaching a plateau of correct performance by almost all examinees (table).

CONCLUSIONS:
Using OSCE as part of the National Board Examination may have not only a summative but also a formative role. Gaps in knowledge can be recognized and corrected if the information on mistakes is nationally distributed.

Examination period						
6	5	4	3	2	1	
100%(38)	97.5%(40)	100%(46)	90%(42)	85%(52)	82%(34)	Patient re-assessment after a change in heart rhythm
100%(10)	100%(10)	100%(10)	90%(10)	100%(12)	95%(19)	Treatment of unstable ventricular arrhythmia
-	100%(10)	100%(10)	64%(11)	78%(14)	60%(15)	Treatment of unstable supraventricular arrhythmia
100%(10)	100%(10)	100%(23)	76%(21)	81%(26)	-	Treatment of stable supraventricular arrhythmia
100%(19)	95%(20)	95%(23)	95%(21)	88%(26)	76%(34)	Airway and breathing assessment in trauma patient
100%(19)	90%(20)	91%(23)	86%(21)	85%(26)	78%(27)	Airway and breathing re-assessment following changes in the patient condition
-	100%(10)	96%(23)	100%(21)	100%(26)	85%(27)	Needle treatment of tension pneumothorax
-	100%(20)	100%(23)	90%(21)	92%(26)	74%(27)	Technique of chest drain insertion
100%(19)	-	100%(9)	90%(21)	85%(26)	73%(34)	Set up of mechanical ventilation in bronchospasm

COI statement: None

Research Abstract : 36

Validation of percutaneous nephrostomy (PCN) performed using the PercMentor[regtm] simulator.

Haim Berkenstadt[1,2,3], Boris Khaitovich[1,3,4], Uri Rimon[1,3,4], Orit Rubin[1,5], Yaron Munz[1,3], Amitai Ziv[1,3]
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Introduction:
The traditional method of acquiring procedural skills is by apprenticeship and involves an extensive period of training with patients. Model-based and virtual reality simulation is gaining interest as alternative training, allowing repetitive practice in a low-risk, trainee focused and safe environment. The objective of this study was to prospectively validate percutaneous nephrostomy (PCN) training using the PercMentor® simulator. The study concentrated on assessing construct validity (the ability of the training system to differentiate trainees according to their clinical experience) and on getting experts opinion on the training modality.

Materials and Methods:
4 groups of 10 medical doctors each participated in the study :1) novices, 2) radiology residents, 3) radiology fellows and 4) board certified invasive radiologists. Following a structured introduction to the procedure and to the simulation system, each participant performed the following tasks:
1) recognition of anatomic structures without fluoroscopy, 2) and with fluoroscopy, 3) calices recognition with fluoroscopy, 4) balloon puncturing, and 5) 2 clinical PCN free training tasks. Evaluation parameters included:
time to task completion, fluoroscopy time, contrast volume used, and the number of balloons punctured over a 5 minute period. At the end of the training participants were asked to fill in a subjective questionnaire regarding the training modality.

Results:
Construct validity of task performance was demonstrated in most parameters. Time to task completion in the recognition of the spleen without fluoroscopy in groups 1), 2), 3) and 4) was 109±61, 56±28, 28±15, 18±7 (mean±SD) seconds, respectively ($F(3,36)=8.3$, $p<0.00$); and with fluoroscopy 103±42, 56±42, 32±20, 22±10 seconds, respectively. The total time for calices recognition was 337±105, 241±58, 154±37, and 117±37 seconds ($F(3,36)=12.8$, $p<0.00$). Time to task completion of the first free PCN task was 175±27, 187±76, 99±38, 36±24 seconds ($F(3,35)=22.8$, $p<0.00$), and for the second free PCN task 103±40, 101±64, 41±14, 30±17 seconds ($F(3,36)=9.7$, $p<0.00$). Contrast material volume used in the first task was 42±13, 44±22, 21±9, 9±6 ml ($F(3,36)=14.8$, $p<0.00$) and for the second task 22±9, 16±6, 9±9, 9±5 ml. The number of balloons punctured over 5 minutes period was 4±1, 5±1, 6±1, 7±0.

The board certified radiologists recommended using the simulator as a teaching tool for residents in invasive radiology (mean score of 6 on a 1-6 scale), and indicated that the imaging achieved by the simulation system is similar to real imaging (score 5±1). The experts indicated that the catheters used are not fully similar to real catheters and that the haptic of working with the simulation system not fully resembles the haptic of human tissues (both scored as 3±1).

Conclusion:
In this study construct validity of the simulation training system was demonstrated and experts recommended its use for training of fellows in invasive radiology. This information is crucial for the validation of the training system but the benefits of training using the simulation system on actual clinical performance remains to be proved.

COI statement: None

Using A Human Simulator In A Laboratory/Conference, A V-Tel System And A Team Based Learning Approach.

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Introduction: In our first year Medical Physiology course for medical (MD) and physician assistant (PA) students, we have been addressing innovative teaching formats and how to utilize our clinical faculty and other resources from our various campuses in a cost and time effective manner.

In this pilot project, existing scripted patient presentations involving the cardiovascular and pulmonary systems were adapted to include use of a human simulator (SimManÒ, Laerdal) in real time. Simulator data was transferred from the hospital to the medical school via a standard based video-conferencing system. There was two-way oral and visual communication between the two sites. The sessions were facilitated by a hospital-based clinician and a basic scientist. Team-based Learning methodologies were employed to direct student discussion of the cases. The two sessions were held one month apart.

Method: The 46 PA students enrolled in the Medical Physiology course were the subjects; the rest of the class, 150 MD students, were the controls and handled the cases in traditional paper-based small groups. After each session, subjects and observers were asked to complete evaluations. These included questions on the role of the simulator and V-Tel system as well as questions on the usefulness of the team-based learning approach for the student's personal learning and for engaging students in the learning process. All students were examined at the end of the second block. The subject's exam scores on each section of the block were compared with that of the controls to see if there was any objective change in student learning related to the use of these conferences.

Results: Questionnaire items were scored on a 1 [least positive] to 5 [most positive] scale. The average students' evaluation of both conferences was 3 or better and the responses to the second conference were slightly better than the first one. In the second conference, 85 - 97% of the class rated factors related to the simulator and V-Tel as 4 or 5 and 75 - 85% of the class rated factors related to individual learning and engagement in the learning process as 4 or 5. The subjects, compared to the controls, showed a small but not significant increase in correct answers on the pulmonary portion of the exam compared to the other sections.

Discussion: This pilot project was successfully received by both the students and faculty, and has spurred interest in applying the format to other physiology teaching and in applying Team-based Learning in other areas of our curriculum.

COI statement: None

Research Abstract : 38

A novel approach to designing a safer hospital using a simulated environment.

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Introduction:

The University of Miami Miller School of Medicine is in the process of designing a new hospital. To evaluate the proposed architectural plans, we built a full-size replica of the proposed hospital room. We used this space to evaluate the proposed location of the sinks/ hand-rub dispensers. An alcohol-based hand rub dispenser was wall-mounted at one of two locations in the patient room and the hand-washing practice of volunteers was noted. This novel approach using a replica of a hospital room has not been previously reported in designing healthcare facilities.

Methods:

A one-liter Purell ® dispenser was wall-mounted in one of two locations in the makeshift patient room. Location 1 was sited across from the patient bed near the entrance to the room (the site on the architectural plans), and Location 2 was positioned immediately adjacent to the patient bed. Following IRB exemption, a total of 52 volunteers were asked to perform a preoperative assessment on a patient who was feeling palpitations. Group 1 (n=26) examined the patient with the Purell in Location 1, and Group 2 (n=26) examined the patient with the Purell in Location 2. The volunteers were all told that they should consider this to be a real patient in a real hospital room and to act exactly as they would in a real patient care setting. Two observers recorded whether the volunteers washed their hands before and after patient contact. Members of Group 2 who did not wash their hands were asked to repeat the patient interview ten minutes later, at which time the canister had been moved to Location 1.

Results:

52 volunteers participated, 26 in Group 1 and 26 in Group 2. Of the 26 in Group 1, 14 (53.8%) were observed to wash their hands. Of the 26 in Group 2, only 3 washed their hands (11.5%). This difference was statistically significant (p=0.0011). The 23 in group 2 who did not wash their hands repeated the patient interview after the dispenser was moved to Location 1. Of these 23 volunteers, 10 (43.5%) washed their hands when they repeated the simulation with the handrub in Location 1(p=0.0016). Only one volunteer washed his hands after examining the patient.

Discussion:

Efforts are needed to develop a healthcare delivery system that works at every level to prevent avoidable harm. This pilot study demonstrated two important findings. First, the location of alcohol based hand rub may influence hand hygiene practice among health care workers. Second, it validated the use of a makeshift model to assess architectural design. If safer hospitals are to be developed, future efforts should include an analysis of the physical design.

COI statement: None

Research Abstract : 39

Bad habits learned on the job or inadequate medical school training? Use of an objective standardized clinical examination to assess hand washing among recent medical graduates.

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Background:

Hospital acquired infections are a major public health crisis, causing thousands of preventable deaths each year. Proper hand hygiene among physicians could potentially produce a dramatic reduction in the incidence of these infections; however compliance with hand washing guidelines has been shown to be suboptimal. One possible reason for this non-compliance is that medical students are not adequately trained in hand hygiene. The aim of this study was to determine the compliance level of proper hand hygiene among recent medical school graduates during a standardized patient encounter.

Methods:

One hundred thirty-one new interns were evaluated during an encounter with a standardized patient (SP) portraying an individual with presumed thyroid disease. The session was part of an annual Patient Safety course given to incoming interns. We instructed interns to see the "patient" and perform a directed clinical examination. Each intern had the opportunity to use wall mounted Purell® alcohol-based hand rub dispensers located outside the examination room, or a sink with chlorhexidine soap located within the examination room. The SP and a course faculty member stationed outside the examination room evaluated interns' hand hygiene technique that included: 1) washing hands before and after the examination; 2) use of soap and/or 3) use of alcohol-based hand rub. Following the encounter, interns were debriefed in small groups and given feedback about their performance. They were also instructed not to discuss the scenario with interns who had not yet completed the course. IRB approval was obtained.

Results

Of the 131 interns who were evaluated, 35.1% did not wash their hands prior to and 95.4% did not wash their hands after patient examination. 5 % rinsed their hands under water but did not use soap, and were considered to have not washed their hands for the analysis. Only 2.3% used alcohol based hand rub. Less than 1% used both soap and alcohol based handrub before and 0% used the combination after the patient encounter.

Discussion

Our results suggest that recent medical school graduates fail to use proper hand hygiene during patient encounters. We believe that the behaviors observed in this study parallel the performance in actual clinical settings since we used a SP in a realistic environment. These findings may underestimate the problem as the interns knew they were being observed, were not rushed, and had only one patient to examine. The lack of hand hygiene following the SP encounter suggests a lack of awareness about personal safety. The problem of hospital acquired infections is not unique to our medical center but rather is seen in alarming numbers throughout the world. Residency training programs should not assume incoming interns are proficient in hand hygiene and should provide mandatory training and evaluation to ensure compliance.

COI statement: None

Research Abstract : 61

Characterizing behaviors associated with expertise in ultrasound guided peripheral regional anesthesia.

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Background:
Ultrasound-guided peripheral regional anesthesia is a new practice with limited literature examining strategies of how to train practitioners to become competent. A preliminary study suggests that ultrasound novices make repeatable errors which could result in iatrogenic injuries.[1] We aim to develop and validate a compact and comprehensive program that trains the ultrasound novice prior to any contact with real patients. The objective of this study was to characterize the behavior of novices learning ultrasound guided peripheral regional anesthesia.

Methods: 6 novices (CA2 residents) received standard training: 1) 50 minute presentation; 2) 6 simulated nerve blocks utilizing both a nerve simulator (Blue Phantom$^{TM,)}$ and a raw turkey breast with an embedded olive.; 3) 2 hour imaging practice session with a standardized patient for the interscalene, supraclavicular, infraclavicular, axillary, forearm, femoral, popliteal sciatic, gluteal sciatic, and ankle regions. Performace of every block performed during a one month period was video-taped and analysed with an expert critiquing technique. Both qualitative and quantitative metrics of performance were codified by two reviewers. Known Errors: a) needle not visualized while advanced, b) inadequate equipment preparation, c) poor ergonomics, d) neural target mal-positioned on ultrasound screen, e) unintentional probe movement f) awkward needle holding, and g) watching hands instead of ultrasound screen with the needle inside the patient.

Results: 520 of possible 536 blocks were recorded and analyzed. A composite score was used to quantify speed and accuracy data. Known errors were still observed despite the training provided. New classes of error and competency were identified: 1) *recognizing mal-distribution of local anesthesia* 2) *recognizing intramuscular location of the needle prior to injection* 3) *prevention of fatigue* 4) *correct correlation of sidedness of the patient with the sidedness of the ultrasound screen* 5) *successful choice of needle insertion site and angle with respect to the probe allowing accurate needle visualization*.

Conclusion: Standard training and observation of subsequent in-situ practice allows critical competencies not achieved. We identified previously unrecognized patterns of behavior. These data will inform subsequent design and development of targeted training interventions to minimize patient exposure to the risks associated with learning-curve error.

References: 1. Sites B, Blike G, Gallagher J. The learning curve associated with a simulated ultrasound-guided interventional task by inexperienced anesthesia residents. *Reg Anesth Pain Med* 2004;29:544-548.

COI statement: None

Research Abstract : 27

Performance Assessment Of Senior Residents During A Simulated Respiratory Arrest.

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Performance Assessment Of Senior Residents During A Simulated Respiratory Arrest

Amanda Burden, MD, Gregory Staman, RN, Marc C. Torjman, PhD, Carolyn Bekes, MD, Michael Kirchoff, MD, Charles Blatz, CRNA

Background

Resuscitation of a patient in extremis is frequently characterized by chaos and physician stress. Although the technical complexity of such situations may vary, resuscitation teams are often composed of residents and fellows, with the more senior trainees expected to supervise their junior colleagues. Those individuals may not possess the basic skills to attend to these emergencies, therefore jeopardizing patient care. Gaba and others[1-3] have identified emergency skills in anesthesia as technical and non-technical, with recent studies questioning how best to identify and teach non-technical deficiencies[4]. This study investigated performance among senior internal medicine and pediatric residents at a University Hospital using a simple resuscitation scenario.

Methods

28 PGY 2-6 residents all having received standard training and certification (BLS/ACLS) prior to this program, were consented for this IRB approved study. All participants attended a lecture on emergency response and were individually introduced to the functions and limitations of the simulator prior to testing. Testing was standardized and the subject read a description of the patient prior to entering the room. Subjects were required to recognize unconsciousness and apnea, and were evaluated on their resuscitation skills. The skills in the scenario were timed and scored as successfully completed, missed, or out of sequence. Videotaping was used to review performance.

Results

The majority (96%) of subjects were unable to successfully complete the scenario. The subjects required 16±11 sec to recognize loss of consciousness and 30±18 sec to call for help. Mean time to first attempt at ventilation was 97±36 sec with corresponding SpO_2 of 76±4.0 percent. Achievement of successful ventilation was evaluated regardless of whether or not the skill was performed out of sequence. 35% of the residents never ventilated successfully.

Conclusions

These results demonstrate that senior residents recognized unresponsiveness but may be ill prepared to resuscitate alone. The finding that resuscitation was delayed or absent may impact patient safety. Videotaping showed the unnecessary tasks performed while delaying ventilation. Important steps were omitted, or carried out of sequence from accepted resuscitation algorithms. With simulation, more effective training of senior residents can be provided based on identified technical and non-technical deficiencies.

1. Anesthesiology 1998; 89(1): 8-18.

2. Br. J Anaesth 2002;88: 418-429.

3. CMAJ April 17, 2001; 164 (8).

4. Anesthesiology 2005;103: 241-8

	Mean ± SD	Percent Subjects
Time To Assess Loss Of Consciousness (sec)	16 ± 11	- -
Time To Call For Help (sec)	30 ± 18	- -
First Attempt To Ventilate (sec)	97 ± 36	- -
Final SpO_2 (%)	76 ± 4	- -

Never Called For Help (% subjects)	- -	15%
No Head Tilt (% subjects)	- -	50%
Unable To Ventilate (% subjects)	- -	35%

COI statement: No Relationships

Research Abstract : 53

Using a 360-Degree Tool to Assess Relational Skills in Simulated and Actual Environments: A Case Study.

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Background:

The Accreditation Council for Graduate Medical Education (ACGME) Outcome Project identifies interpersonal and communication skills as a core competency requiring improved teaching and assessment. The aim of this case study is to pilot a 360-Degree style tool with Gap analysis for data collection in actual and simulated ICU family meetings, and to develop a graphical treatment of that data to assist in formative feedback. Significant negative gaps have been associated not only with a need for improvement, but also with insufficient insight regarding the skill assessed.

Methods:

The 360-degree survey was adapted from the previously validated Essential Elements: The Communication Checklist, by the Bayer-Fetzer group. Additional items were then added to better reflect communication in the ICU. Forced choice items as well as Likert scores were used to assess each aspect of communication. The Pilot subject chosen was a second year PICU fellow. The tool was used to assess the communication skills of this individual during both an actual and simulated PICU family meeting. Simulated meetings were a part of Children's Hospital of Boston's Program to Enhance Relational and Communication Skills (PERCS). All involved with each meeting completed the survey, with actors filling the role of the family for the simulated encounter.

Results:

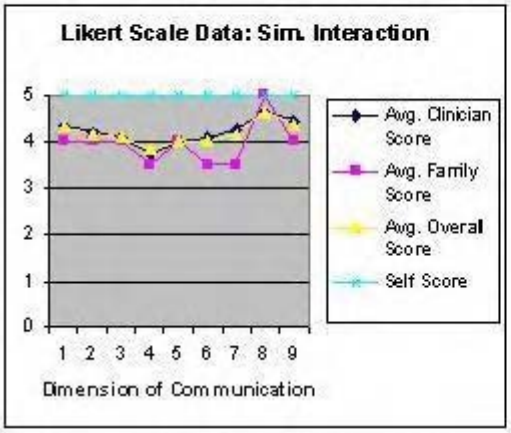
To date four fellows have entered the study, and we report on the actual and simulated family meeting data derived from our first participant. Graphic displays of data from the simulated interaction showed consistent profiles of strength and weakness within the context of a meeting, and a Gap Analysis from that interaction was produced (Fig 1). Similar profiles were produced for the actual family meeting.

Conclusions:

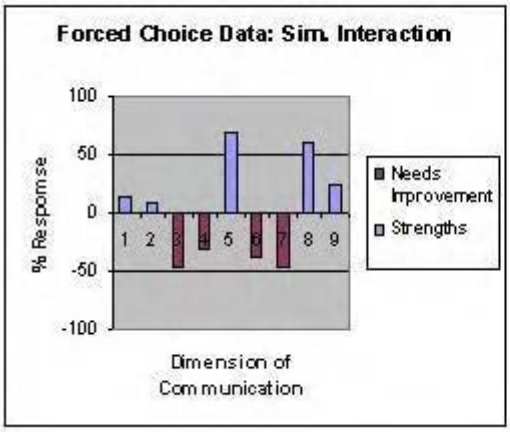
This 360-Degree tool shows promise as a means of data gathering in simulated family meetings and, with more data, could allow us to better characterize the concordance that exists between actual clinical situations and their simulated counterparts. Graphical displays of Likert, forced choice, and gap data will enable us to deliver more reliable formative and evaluative feedback regarding simulated encounters. We look forward to drawing more rigorous conclusions as our sample size increases.

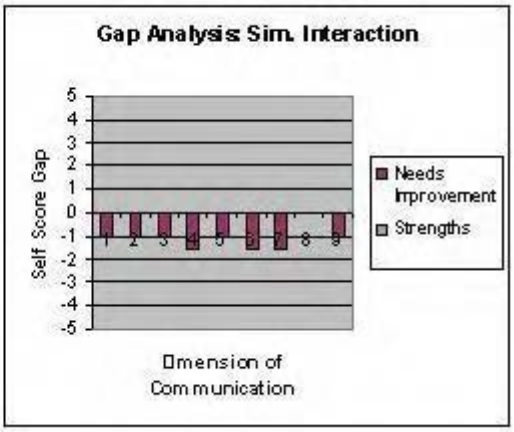
COI statement: None

Figure 1: Graphical Survey Data Displays



Dimensions of Communication:
1: Builds a Relationship
2: Opens the Discussion
3: Gathers Information
4: Understands the Family's Perspective
5: Shares Information
6: Reaches Agreement
8: Provides Closure
9: Demonstrates Empathy
10: Communicates Accurate Information





Research Abstract : 63

Development and evaluation of a multi-professional high-fidelity simulation course against best evidence criteria for establishing effective learning.

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Background

Trent Simulation & Clinical Skills Centre has been open for two years. Each year new courses are designed and developed to aid learning for a wide variety of healthcare professionals. In 2005, Issenberg et al published a Best Evidence Medical Education (BEME) systematic review highlighting the 'features and uses of high fidelity medical simulations that lead to effective learning'.[1] The ten features described in the review are providing feedback; repetitive practice; curriculum integration; range of difficulty level; multiple learning strategies; capture clinical variation; controlled environment; individualised learning; defined outcomes and simulator validity. As part of a course evaluation we aimed to ascertain whether a new high-fidelity simulation course we had developed met the published criteria.

Method

The Foundation Advanced Simulation Training (FAST) course was developed as a multi-professional, ward-based, acute-care simulation course, and had specific learning outcomes mapped to both the Foundation Programme Curriculum (Doctors) and the Knowledge Skills Framework (Nursing). The course accommodated eight doctors and four nurses per day. Four scenarios, each with two high-fidelity manikins or standardized patients ran simultaneously with a fully facilitated feedback and debriefing session, and candidate mentoring. As part of the course evaluation each participant rated questions or statements related to the content and delivery of the course using a 5-point Likert scale in a pre and post-course questionnaire. Questions pertinent to the ten features and uses of high-fidelity medical simulations that lead to effective learning were also included.

Results

201 doctors and 51 nurses attended the course over a 5-month period and all completed the questionnaire. Twenty-eight of the questions helped to ascertain whether the course met the standards described above. In 23 of these over 90% of candidates agreed or strongly agreed with relevant statements. For example 91% of candidates felt they had been given valuable feedback about their performance and the same number also felt that the feedback had improved their learning. Prior to the day only 72% had appreciated the importance of reflection, feedback and debriefing in improving the quality of their personal learning. Other 'criteria' achieved included 'repetition' (92%), 'curriculum integration' (97%), 'controlled environment' (99%) and 'individualised learning' (98%). Criteria with lower agreement levels included 'defined outcomes', where 78% agreed or strongly agreed that learning outcomes were made obvious to them for each scenario. However 96% felt scenarios reflected the learning outcomes for the day and 94% felt the learning outcomes were well chosen. 89% felt they were very likely to be able to apply the learning outcomes from the day to real clinical situations.

Conclusions

The BEME review has provided a useful way to help us evaluate a new course in comparison to a gold standard. Some features are harder to evaluate than others in questionnaire fromat and certain features are harder to achieve. This paper will present our comparative evaluation in more detail and highlight some of the difficulties encountered in the process.

1. Issenberg et al (2005). Features and use of high-fidelity medical simulations that lead to effective learning: a BEME systematic review. Medical Teacher, 27; 10-28.

COI statement: None

Research Abstract : 49

Using High Fidelity Simulation to Enhance Perceptions of Competency and Safe Practice in Anesthesia Assistants .

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Background: The Michener Institute for Applied Health Sciences educates health professionals and addresses human resources requirements in healthcare in Ontario. In 2005 a new program for Anesthesia Assistants (AAs) was designed and implemented to address waiting times for surgical procedures. An AA under the supervision of an Anesthesiologist, can assist in the provision of anesthetic care, thereby potentially facilitating the flow of patients through operating rooms and reducing waiting times for procedures. High fidelity simulation was integrated throughout a 13 week didactic curriculum to aid in achieving competency in newly identified skill areas for AAs. A clinical education component followed the didactic phase of the program. The purpose of the study was to examine the perceptions of AA students as they pertained to enhancing competency and safe practice**.**

Methods: Following ethics approval, qualitative methodology was used to elicit the perceptions of the learners (n=24) in each of the first 2 cohorts of the Anesthesia Assistant program. Learners consisted of Registered Respiratory Therapists, all of whom had precious experience working in the Operating Room. Learners were asked to keep a reflective journal of their experience with learning via high fidelity simulation. Thematic analysis of was conducted of the learners' reflective journals. In addition, a focus group was conducted following completion of the classroom/simulation portion of the curriculum**.**

Results: There were four major themes identified throughout the data: anxiety, comfort, patient safety and added value**.** Participants expressed initial anxiety with using simulation and a strong fear of being team leader. By week two, they began expressing their perceptions of the impact this method of training was having on their skill level and competency. Gaps in knowledge and weaknesses in skill demonstration were highlighted through simulation. Debriefing activities provided opportunities for formative feedback. By week six, most participants expressed a positive perception of their competency. They saw value in simulation use in the integration of skills and behaviours in a safe environment. They expressed gratitude that they were able to make mistakes during their learning process without endangering patients. By week six participants no longer expressed fear of assuming the role of team leader. While comfort with this role was widely variable over the first six weeks of the program, many participants expressed the desire to assume the role more frequently. Satisfaction with simulation as a method of teaching and evaluating AA competency based skills was strongly expressed in reflections and the focus group.

Conclusions: Simulation activities integrated into the curriculum of an AA program were perceived as effective in enhancing skills and competency while maintaining patient safety. Participants were cognizant of the value of simulation with respect to both practice of new skills and assessment of competency. Although initially anxious about assuming the role of team leader, the simulation enhanced curriculum allowed opportunities to safely practice which resulted in increased comfort with this role. Further study could be done to explore the correlation between enhanced perception of competency and actual competency pre and post simulated learning experiences.

COI statement: None

Research Abstract : 67

Validation and testing of a postpartum hemorrhage simulator.

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Background: Postpartum hemorrhage is a common and potentially life-threatening obstetric emergency. We sought to create a realistic simulator to for residents and validate a standardized grading form to improve and evaluate competency in the management of postpartum hemorrhage.

Methods: Residents from three programs underwent training with a postpartum hemorrhage simulation which utilized a standard obstetric birthing model equipped with an inflatable uterus to simulate uterine anatomy that was able to bleed from the model's cervical os and out of the vagina. All simulations were graded by at least two different staff physicians with a standardized grading sheet constructed from the current literature on the topic. Residents were expected to recognize the hemorrhage and take appropriate steps, including asking the assistant to administer medications, to correct the problem. The scenario ended when the residents administered two medications correctly and performed uterine massage or after 5 minutes. Residents were then given immediate feedback on their performance. Objective and subjective performance was measured with standardized grading sheets and these results were then placed into a database and analyzed for reliability using Cronbach's alpha. This project was conducted in accordance with the hospital IRB policies at each institution.

Results: Residents from three institutions underwent simulation training. The majority were able to correct the hemorrhage within 5 minutes but more than half also made at least one error, either the dose or route, in the medications they requested. Reliability was evaluated with Cronbach's alpha and demonstrated that the subjective grading sheet was valid for the simulation.

Conclusions: A simulated postpartum hemorrhage scenario can identify important deficiencies in resident knowledge and performance with no risk to patients. The standardized grading form worked well for the purpose of evaluation and was reliable in our study. Further testing is needed to evaluate if the training improves performance in real life hemorrhages. Because of our findings we are incorporating this training into our simulation curriculum at Madigan Army Medical Center and will continue to monitor resident performance and progress for this obstetric emergency.

COI statement: None

Research Abstract : 51

Simulation, an educational approach to foster collaborative interdisciplinary education.

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Background

Today, to meet the increasing challenges of healthcare, a more integrative approach is needed to achieve high quality, efficient and cost effective care that ultimately will improve patient care and results in positive outcomes. Assuring that students' have exposure to critical clinical experience is often a challenge. Simulation is ideal for high risk, low incidence situations. In these situations, there is little opportunity to practice with no room for error. Simulation provides students the opportunity to perfect skills through repeated practice in a safe environment.

Purpose

Collaboration was combined with simulation as a learning experience with the goal of facilitating interdisciplinary collaboration in a crisis situation. The purpose of this study was to analyze students' perceptions of collaboration, and to determine the usefulness of an interdisciplinary approach using simulation as an educational strategy.

Method

A pre-test post-test design was used to assess students' perceptions of interdisciplinary collaboration with a simulation learning experience. The sample was a convenience sample of third year medical students and fourth year nursing students from a large urban city university. Total participants who completed pretest were 82 (nursing students, n=68 and medical students, n=14). Total participants who completed post-test were 40 (nursing students, n=31 and medical students, n=9).

Both quantitative and qualitative data were collected to describe students' perceptions of collaboration. The Jefferson Scale of Attitudes Towards Physician-Nurse Collaboration, a 15 item Likert-type scale was used with permission to obtain students' perceptions on collaboration (Hojat, et al, 1999). Demographics were obtained to describe the sample. Qualitative data were obtained with open-ended questions that provided meaning to the quantitative findings.

Upon receiving IRB approval, using Laerdal's Sim Man, a human patient simulator, medical and nursing students worked together as a team in a "mock code" scenario. Data were collected prior to the simulation and again after the simulation.

Data Analysis

Descriptive statistics were used to describe the demographic data of the sample. Reliabilities were established on instrument pre and post-testing ranging from r= 0.84 to 0.96. Analysis of variance (ANOVA) was used to detect differences between medical and nursing students' pre/post test scores. The anecdotal data were examined using a quasi-statistical analysis with manifest content analysis.

Results

The nursing students had higher pre-test score than the medical students reflecting a more positive attitude towards collaboration. There was an increase in medical students' mean post-test scores reflecting a more positive attitude towards collaboration. Statistically significant difference (p=0.05) were seen in medical students' post-test scores for two factors, collaboration and nursing autonomy.

The qualitative data analysis identified common themes of communication, teamwork and patient outcomes. The nursing students' perceptions of the nurse-physician relationship became more collaborative after the interdisciplinary simulation experience. Both medical and nursing students described the experience as a "wonderful learning experience," one that should be continued.

Conclusions

Although there were limitations associated with this study, hopefully this project will act as a catalyst for further research in collaborative interdisciplinary education using simulation as an educational strategy.

COI statement: None

Research Abstract : 6

Effectiveness of Simulation-Enhanced PALS Instruction: A Randomized Trial.

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Background: Pediatric housestaff experience with resuscitation is hampered by infrequent patient events and the prevalence of senior and/or specialized clinicians. Mock resuscitation exercises have been shown to be effective at teaching resuscitation skills to pediatric residents. Evidence supporting the effectiveness of simulation in teaching pediatric resuscitation is lacking.

Objective: To assess the performance of resuscitation skills on simulated patients by pediatric junior housestaff before and after an instructional session reviewing PALS guidelines.

Hypothesis: Pediatric residents will have greater improvement in the performance of critical tasks during mock resuscitations following a PALS training session enhance by high-fidelity simulation compared with standard manikin simulation.

Methods: Pediatric residents were randomized to simulator (SIM) or manikin (MAN) groups. Each subject went through three consecutive phases: phase 1, a series of mock resuscitation exercises focusing on PALS algorithms (asystole, SVT, apnea, shock); phase 2, a didactic review of the PALS algorithms; phase 3, a second series of mock resuscitation exercises reviewing the PALS algorithms. For the SIM group, phases 1 and 3 were completed on an infant patient simulator (SimBaby, Laerdal); for the MAN group, phases 1 and 3 were completed on a standard manikin. Phase 2 was identical for both groups, with the exception of physical signs pertinent to the PALS algorithms being demonstrated on the simulator for the SIM group.

Data collected included whether a predetermined list of critical tasks were performed for each scenario and the elapsed time until their completion. Data was collected in phase 1 and phase 3 of the study. Task completion is described in proportions; times to completion of tasks are described in means with standard deviations. Differences in outcomes of interest for SIM and MAN groups were compared by univariate analysis.

Preliminary results: 31 residents have completed the study to date (SIM=16; MAN=15); approximately 75 additional residents will be approached. Phase 1 performance was similar for both groups for all 4 scenarios. In the asystole scenario, SIM subjects had significantly better improvement in task performance ($p=0.02$) and performed tasks in proper sequence more often ($p=0.05$); differences between SIM and MAN groups for the other scenarios are not statistically significant. Overall, mean time to task completion was improved in 16/19 tasks.

Timeline for Study Completion: Data collection will continue from November 2006 through January 2007; analysis and reporting of data will be completed by June 2007.

Supported by an award from the Laerdal Foundation for Acute Medicine

COI statement: The presenting author is a grant recipient from the Laerdal Foundation for Acute Medicine

Research Abstract : 33

Anesthesia Machine Checkout and Troubleshooting: Does How We Teach Residents Impact Retention?

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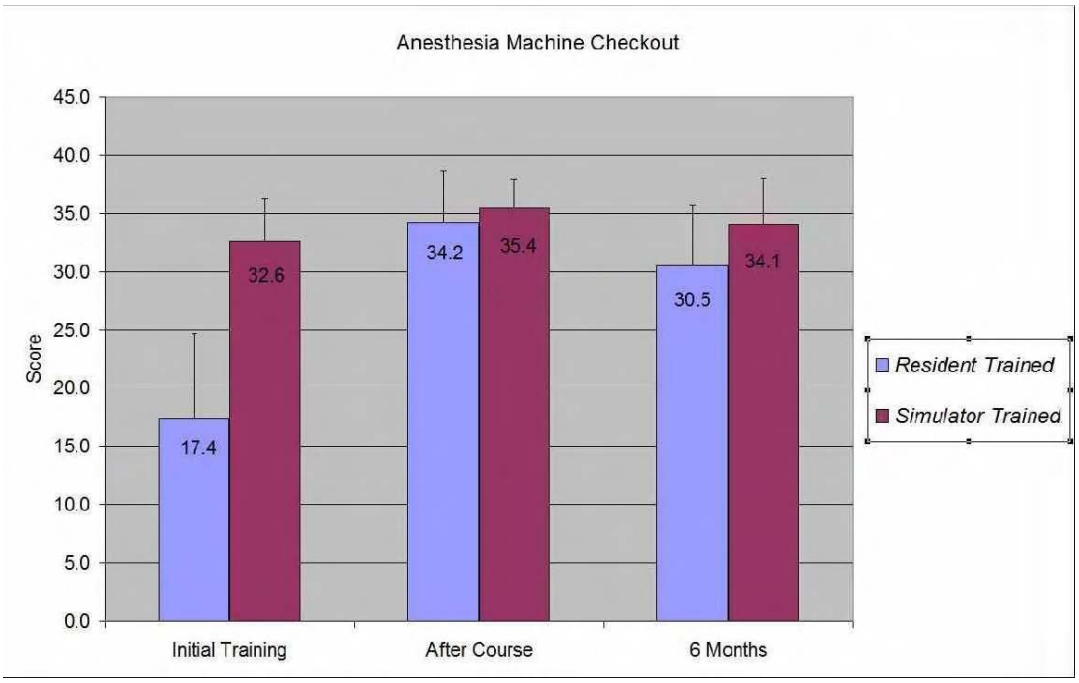
Background: Recent advances in anesthesia machine design have automated the process of checking machines. However, most anesthesia sites are still using machines requiring manual checkout. Traditionally, CA-1 residents are trained by watching senior colleagues perform machine checkouts during daily routines and then performing them under their supervision. In this study, we compared traditional training with training in a Simulation Center using an anesthesia machine that could be modified to simulate machine failures.

Methods: 25 CA-1 residents were randomly divided into 2 groups. Group SIM spent their first week of residency in the Simulation center taking a course on basics of anesthesia with one day devoted exclusively to anesthesia machines including lectures, demonstrations, routine practice, and identification and repair of malfunctions. Their second week was spent one-on-one with a senior resident in the operating room. Group RES spent the same two weeks in the opposite order. Skill testing after initial training (INT) was done after the first day in the Simulator (SIM group) or after one week in the operating room (RES group). Both groups were tested immediately after the complete course (AFT) and 6 months later (6MO). The exam consisted of performing a machine check with an unknown number of malfunctions present. All exams were videotaped and reviewed by two blinded observers and scored using a checklist.

Results: The SIM group did significantly better after INT (32.56±1.03 SEM vs. 17.38±1.88, $p<0.0001$) and trended better at 6MO (34.06±1.08 vs. 30.5±1.49, $p=0.062$) with no significant difference at the end of the course. RES also did significantly better AFT vs. INT (34.20±1.15 vs. 17.38±1.88, $p<0.0001$).

Conclusions: Training residents to perform complete machine checks while under time pressure to get the room ready in the morning is difficult. The RES group did much worse on their INT exam compared to their SIM counterparts. Both groups finished the course with equal scores. Simulator training was significantly better for teaching machine checks. Also, retention of knowledge at 6MO trended toward better in the SIM group. This suggests that initial anesthesia resident teaching methods may have an impact on future retention and performance of thorough machine checks.

COI statement: None



Research Abstract : 30

USE OF HUMAN PATIENT SIMULATION-BASED TRAINING TO TEACH INTERDISCIPLINARY TEAM SKILLS IN A DOCTOR OF PHARMACY CURRICULUM.

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Background: High fidelity human patient simulators (HPS) are capable of both simulating realistic patient encounters and giving real-time, physiologically accurate feedback. Such an immersive, realistic training environment provides an opportunity for experiential learning in a patient-safety oriented manner. HPS has been used for interdisciplinary training in medicine and nursing training programs but has not seen widespread use in pharmacy training programs.

Purpose: To determine student acceptance of a human patient simulation (HPS)–based training module focused on interdisciplinary teamwork skills.

Method: During the second year of training, all pharmacy students were concurrently enrolled in *Principles of Pharmacotherapy 4: Cardiovascular Diseases* and *Patient Care Lab IV*, a problem-based learning course that focused on interpersonal and systems-based practice skills. As part of the *Patient Care Lab*, students participated in a one-hour HPS-based simulation of an acutely ill patient with a hypertensive emergency. During the simulated case, students took a history and performed a physical exam on the mannequin. They were then prompted by nursing and physician staff to make treatment recommendations, including calculating drip rates and making suggestions for monitoring and ancillary testing. Following the simulated exercise, a facilitated debriefing session occurred. Students completed evaluation surveys to assess the quality and effectiveness of the session.

Results: All students (n=73) completed the training and filled out a post-simulation evaluation survey (100% compliance). Over 98% of students agreed or strongly agreed that they learned material relevant to their practice as a pharmacist. When compared to student lectures, 90% of students felt that they learned clinical patient care better with a simulated patient scenario. Over 90% of students reported that, if given the choice, they would like to participate in similar exercises in the future.

Conclusions: HPS-based learning offers a realistic training experience through which clinical knowledge and interpersonal, teamwork skills can be taught while reinforcing basic concepts of pharmacotherapy. Students enjoy the experience and find it relevant to their future practice. This teaching modality may help educators target the need for interdisciplinary training and experiential learning, key areas of focus in the Accreditation Council for Pharmacy Education (ACPE) recommendations for pharmacy education. Further work is necessary to determine how to best implement this new technology for both training and assessment.

COI statement: None

Research Abstract : 40

A Combined Medical and Surgical simulation based training curriculum for 3rd year medical students – Students perspective.

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Introduction

In an effort to understand how to better integrate simulation into the standard clerkship in ways that compliment rather than compete with the standard curriculum we developed a combined simulation curriculum between the 2 largest disciplines for 3rd year medical students.

Our main objective was to train the students in the management of common medical and surgical emergencies. Through exposure to HPS, students become "primary care-takers, diagnosticians and decision-makers" in a "realistic", uniformly controlled and forgiving educational environment. This opposes their usual third year student role of "observer" and "follower

Methods

We had 1 group of 8 students in each clerkship rotation. Students were exposed to 5 clinical problems per 12-week clerkship rotation:). (a) hypotension secondary to GI bleeding, (b) chest pain (c) respiratory distress secondary to asthma (d) sepsis secondary to acute cholecystitis (e) specific cases relative to the respective clerkships :Arrhythmia management – Medicine, General Trauma Management – Surgery. As the students will progress through their third year clerkship rotations and proceed from the first of the two 12-week rotations (either Medicine or Surgery) to the second, they will encounter the second set of scenarios which will have an increasing degree of difficulty.

Students received and completed anonymous surveys during orientation week and at the end-of-each rotation with the goal of measuring their perception of learning outcomes and the value of simulation in their curriculum.

Results

A total of 16 students attended the simulation based training. Preliminary data results indicate that students valued simulation based training extremely high and found it a very valuable learning experience. Most students noted that being in the "hot seat" make them learn and retain information significantly better than being just observers. They felt that they learned how to approach a problem better particularly in terms of using a systematic approach. They thought that simulation based training increased their confidence in taking care of critical patients and improved their practical skills tremendously. The debriefing sessions where considered very useful because of the real time feedback. Discussions with the program directors revealed that students were enthusiastic about their experience and they felt that should be used more or should be mandatory in training.

Conclusions

Simulation training is valued high by medical students and represents a valuable and positive educational tool. Our experience support the use of simulation based training for medical students education.

COI statement: None

Research Abstract : 11

High-stakes assessment of clinical skills in a simulated environment.

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Background: Consistent with its mission to protect the public, the National Board of Osteopathic Medical Examiners (NBOME) implemented a clinical skills examination into its COMLEX-USA licensure examination series in 2004. The COMLEX-USA Level 2-Performance Evaluation (Level 2-PE) assesses the clinical skills of osteopathic candidates in a simulated clinical environment with standardized patients. These skills include physical examination, medical history-taking, palpatory diagnosis and osteopathic manipulative treatment (OMT), doctor-patient communication, professionalism, and written communication skills. Physician raters score the written notes and OMT.

Method: Candidates completed a twelve station examination, where they are asked to evaluate and treat the standardized patient as appropriate. Candidates are allotted 23 minutes to complete the interview and patient evaluation and to document and synthesize their clinical findings, impressions, and plan in a written note. All testing was completed at NBOME's National center for Clinical Skills Testing, a state-of-the-art simulation facility designed to ensure the necessary safety, security, and standardization required for high-stakes testing.

Results: From September, 2004 through June, 2006, NBOME tested 5748 candidates. First-time takers had a 95.7% pass rate. Generalizability coefficients for the data-gathering and doctor-patient communication components of the examination ranged from 0.78-0.84, respectively. There were modest correlations between scored Level 2-PE components (data-gathering-written note, r= .50). Correlation between clinical skills components and knowledge-based clinical science scores were moderate.

Conclusions: The addition of Level 2-PE to the COMLEX-USA examination series allows for the valid and reliable measurement of clinical skills in a simulated medical environment. While standardized patients offer the opportunity to assess "hands-on" skills, many patient conditions are difficult, or impossible, to simulate. Other relevant competencies (e.g., technical procedures sure as phlebotomy and sensitive examinations such as digital rectal examinations) are difficult to test using standardized patients. Here, to improve the content validity of the assessment, the addition of other simulation modalities may be helpful.

COI statement: None

Research Abstract : 43

Correlation of Physician Performance in a Simulator-Based Environment to Actual Error Rates in the Intensive Care Unit (ICU).

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Introduction: Despite the inherent appeal of simulator-based training for critical medical events, the correlation between simulator-based performance and real-world behavior remains unclear.

Purpose: To explore whether directly observed error rates among interns can be independently correlated with performance in a simulator-based testing environment.

Methods: Volunteers participating in the Intern Sleep and Patient Safety Study (Landrigan, NEJM 2004;351:1838) each reported to the simulator lab in an initially rested, and then sleep-deprived state (24+ hours on-call; cohort 1 [n=17]). A subset also subsequently presented after a modified overnight shift ($\leq$16 hours on-call, cohort 2 [n=8]). During each lab visit, subjects were asked to manage two critically ill patients (1 medical case; 1 cardiac arrest). Each case was scored by an on-site physician using a validated performance assessment tool (case score=1[worst]-8[best], accounting for major errors; average of both case scores=session score). Session videotapes were also reviewed by a blinded, independent rater.

Results: We conducted 50 simulator sessions (25 rested, 25 sleep-deprived) comprising 100 cases (2 per session). Among all subjects (cohort 1), the simulator session score averaged 6.0 (95% CI: 5.4-6.7) in the fully-rested state, and declined to 5.0 (95% CI: 4.4-5.6) after the traditional overnight shift (p=.008). Among those who progressed to a shortened overnight shift (cohort 2), the simulator session score averaged 5.8 (95% CI: 4.4-7.2; p=.002 compared to their traditional overnight score of 4.3 [95%CI: 3.4-5.3]). The inter-rater correlation coefficient (ICC) for the blinded (versus on-site) ratings was .80.

Conclusions: In a simulator lab, fully rested interns performed better than traditionally sleep-deprived interns in the management of critical patient scenarios; interns also performed better after a shorter overnight shift compared to a longer overnight shift. These findings are consistent with real-time hospital studies documenting fewer serious medical errors among more rested interns. Such a correlation supports the validity of simulation as a clinical performance assessment tool.

Acknowledgements: Supported by a grant from the Agency for Healthcare Quality and Research (AHRQ). Special thanks to Suresh Venkatan, MBBS, for his assistance as an independent rater.

COI statement: None

Research Abstract : 44

Multi-institutional high fidelity simulation and task training "Boot Camp" orientation program: a report from a pediatric critical care simulation consortium

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Background: Pediatric critical care (PCC) 1st year fellows spend the majority of their time in clinical practice. A PCC fellow requires confidence and rapid development of clinical expertise with a wide variety of presentations of critical illness and basic therapeutic approach and interventions. Most often, clinical orientation is accomplished through bedside experience with attending mentorship and guidance. Simulation-based medical education provides a tool to integrate didactic knowledge, technical skills, and crisis resource management enhancing clinical competence to improve patient safety and quality.

Purpose: An innovative multi-institutional high fidelity simulation (HFS) and task training (TT) orientation "boot camp" program was designed and implemented for 1st year PCC fellows to provide: 1) high-fidelity scenarios representing PCC algorithms, 2) task training on vital therapeutic procedures, and 3) team training and communication techniques in a non-threatening, safe environment.

Method: PCC orientation training scenarios developed by volunteer faculty from 7 regional pediatric institutions covered common topics surrounding resuscitation, sepsis, traumatic brain injury, abdominal trauma, vascular access, difficult airway, arrhythmias, and delivery of bad news. Task training included vascular access skill training for central venous catheterization, and basic and difficult airway management skill training with infant/pediatric/adult task trainers. Several of the sessions combined group didactic/discussion sessions. Key features emphasized to lead effective learning with high fidelity simulation were feedback, repetitive practice, curriculum integration, and clinical variation, range of difficulty level, multiple learning strategies, controlled environment, simulator validity and defined outcomes. The key feature emphasized in task training was individualized learning. An anonymous Likert scale (1-5) evaluation was utilized for participant feedback and a daily feedback session occurred each day. Participant satisfaction and creation of team cohesion was evaluated by Likert scale. Analysis by T-test, was used where appropriate.

Results: 22 1st yr PCC fellows, 1 hospitalist, and 1 emergency medicine fellow participated in the 3-day "boot camp." 13 faculty facilitated the 15.5 hour training sessions with 25% didactic, 30% task training, and 45% high fidelity simulation. Daily feedback sessions from participants suggested repetitive practice of critical assessment/intervention skills would be a more effective training tool. The facilitators modified their teaching approach to "train to success." Achievement of session objectives (SO), format effectiveness (FE), understanding of information (UI), and simulation device/equipment effectiveness (SE) was improved following this "train to success" modification: SO before (4.64±0.55) vs. (4.82±0.39) after [p=0.03]; FE before (4.52±0.72) vs. (4.69±0.52) after [p=0.09]; UI before (4.73±0.50) vs. (4.79±0.41) after [p=0.22]; SE before (4.49±0.85) vs. (4.82±0.39) after [p=0.04]. Boot camp success in creating team cohesion was highly rated (4.78±0.52). Overall simulation orientation "boot camp" participant satisfaction was (4.67±0.55).

Conclusion: A multi-institutional "boot camp" orientation for PCC fellows utilizing HFS and TT orientation is feasible. Modification of training based upon participant feedback assists in the achievement of the primary goals of PCC orientation, especially achievement of session objectives, format effectiveness, understanding of information, and simulation equipment effectiveness. A "boot camp" approach is perceived as satisfying and promotes team cohesion among critical care fellow trainees.

Supported by Endowed Chair of Critical Care Medicine at The Children's Hospital of Philadelphia

COI statement: None

Research Abstract : 31

The use of simulation to assess dynamic descision making.

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Introduction
In dynamic situations such as in the intensive care unit, decisions are often made by applying precompiled rules for a particular event relying on past experience to predict future outcomes. Klein has described this type of thinking as recognition primed decision-making 1. Two common clinical conditions in critically ill patients include hypotension from sepsis and chest pain from myocardial ischemia. If presented with a patient with either one of these conditions, a precompiled response could be used to start treatment. Treatment challenges arise if clinicians are presented with a patient with both problems. We retrospectively reviewed the treatment of a simulated septic patient who subsequently developed myocardial ischemia.

Materials and Methods

Following IRB approval, we reviewed ten audiovisual recordings of fully immersive high fidelity ICU course simulations taught at the Palo Alto VA from June 2003-June 2004. Medical management was first provided by an intern with a senior resident arriving, on average 12 minutes, into the scenario.

The METI-HPS was used for all of the simulations. The scenario involved an elderly male admitted to the ICU for low urinary output, increasing heart rate and hypotension, with the presumptive diagnosis of urosepsis. The patient developed chest pain and ischemic EKG changes 8 minutes into the scenario. The teams' overall performance was scored as either management of primary sepsis, primary ischemia, or both.

Results

All ten teams began the appropriate treatment of sepsis (additional intravenous access and fluid). Upon the development of chest pain (HR 120's BP 80's/50's) 5 teams deviated from the sepsis treatment plan and converted to a primary cardiac treatment plan, including giving aspirin, nitrates, heparin and morphine. Four teams continued with the sepsis pathway, including either starting or escalating vasopressors, and one team treated the patient as having both a cardiac and a septic event.

Discussion

Medical decision-making often relies on pattern recognition. Using precompiled responses, for example treatment pathways, cognitive aids, and mnemonics; a physician can make decisions more efficiently. If faced with novel situations or if conflicting treatment goals arise, physicians are required to use abstract reasoning to determine the most appropriate next step. In this scenario, the patient developed myocardial ischemia secondary to increased demand from the hypotension and tachycardia caused by sepsis. Half the teams converted to a primary cardiac pathway treating the patient's ischemia as a primary cardiac event. This conversion not only delayed appropriate treatment but also resulted in morbidity. Cognitive tunneling may have occurred as the teams relied on familiar medical management even when it was inappropriate.

We could not question the participants on why they chose a primary cardiac treatment pathway, as this was a retrospective study. Further investigation is needed to determine if these errors were secondary to lack of experience or represent a more fundamental flaw in the way dynamic decision-making is taught in medical education. Simulation is a useful method to probe such issues.

References:

1.Klein GA: Recognition-primed decisions. Adv Man Machine Syst Res 5:47, 1989

COI statement: None

Research Abstract : 70

Assessing cardiac physical examination skills using simulation technology and real patients: A comparison study.

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Background: Simulation technology provides additional methods to assess physicians' clinical competence in physical examination. The current study examines the relationship between internists' competence in cardiac physical examination as assessed using simulation technology compared to real patients.

Methods: We assessed internists' competence in cardiac physical examination skills and bedside diagnostic accuracy during a 12 station OSCE. The OSCE contained 3 modalities of cardiac patients: 4 stations using real patients (RP) with cardiac abnormalities, 4 stations using standardized patients (SP) combined with a computer-based audio-video simulation of auscultatory abnormalities and 4 stations using a cardiopulmonary patient simulator (CPS). Four cardiac diagnoses were tested: normal, mitral regurgitation, aortic stenosis and mitral stenosis. Cardiac diagnoses and the specific cardiac findings for each diagnosis were matched across modalities.

Participants were 28 internists, within 3 years of passing the Royal College of Physicians and Surgeons of Canada's (RCPSC) Comprehensive Examination in Internal Medicine. At each station, two RCPSC examiners independently rated a participant's physical examination technique and provided a global rating of clinical competence. The accuracy of a participant's cardiac diagnosis for each patient was scored separately by two investigators.

Results: The inter-rater reliability between examiners, for the global rating outcome, was 0.76 for RP stations, 0.78 for SP stations and 0.75 for CPS stations. Although there was no significant difference between participants' mean global ratings for each modality (effect size = 0.05, p> 0.05), the correlations between participants' performance on each modality were modest (Table 1).

Conclusions: While patient findings and diagnoses were matched as close as possible, variability among the real patients and logistical limitations with the simulation stations could affect the correlations between modalities. The results suggest that simulation technology used purely for assessment purposes may not be interchangeable with real patients. Future work will include increasing the number of cardiac conditions and improving the objective measurement of performance.

TABLE 1: Correlations between OSCE station modalities, for 3 outcome measures

OSCE stationmodalities	Outcome Measure		
	Global Rating	Physical ExaminationTechnique	Diagnostic Accuracy
RP vs. SP	0.19	0.40*	0.31
RP vs. CPS	0.22	0.35	0.16
SP vs. CPS	0.57**	0.64 **	0.39*

* $p < 0.05$; ** $p < 0.01$

COI statement: None

Research Abstract : 5

Initial Management of Simulated Life-threatening Emergencies by Nurse Anesthetists and Anesthesiologists.

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Background

A nurse anesthetist or an anesthesiologist may at times be the sole anesthesia practitioner in the operating room. During such periods, unexpected life-threatening emergencies may occur. This study was conducted to discover whether individual anesthesia practitioners are able to diagnose and treat emergencies in a timely manner, and whether there is a difference in this regard between anesthesiologists and nurse anesthetists.

Method

This study was conducted from 2001-2004. It was a prospective randomized single-blinded study conducted in the simulation center at a University Hospital. Thirty five anesthesiologists and 26 nurse anesthetists participated in the study. Anesthesia practitioners were presented with eight intra-operative emergencies. Five minutes were allocated to each scenario. Video recordings allowed objective scoring. Times to do diagnostic tests, times to make diagnoses and times to institute appropriate treatments were scored.

Results

There were no major group differences in the times to do diagnostic tests, reach diagnoses and institute treatments. Anesthesiologists achieved a higher percentage of total scoring items than nurse anesthetists (67.1% verses 60.4% (95% CI for the difference = 2.7 to 10.8%; p=0.004). There was a wide range in both groups in all scenarios ranging from rapid accomplishment of all the tasks to non achievement of any task within 5-minutes. The highest and lowest scoring nurse anesthetists achieved comparable scores to the highest and lowest scoring anesthesiologists. In five out of 55 (9%) scoring items, anesthesiologists were significantly faster. In one out of 55 (2%), nurse anesthetists were significantly faster.

Conclusions

Anesthesiologists performed slightly better, but there was variability in both groups. Many nurse anesthetists and anesthesiologists managed most of the simulated emergencies. Concerning, however, was that in both groups there were practitioners who failed to diagnose and treat simulated emergencies. In clinical practice, this would pose a threat to patient safety. Simulation training might help anesthesia practitioners improve and maintain skills to manage life-threatening intra-operative emergencies.

COI statement: Bernadette Henrichs is a speaker for Baxter Healthcare.

Research Abstract : 22

Evaluation of an integrated approach to teaching and learning gynaecology procedures using hybrid simulations.

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Background

We have developed an approach to teaching clinical procedures that uses hybrid simulations in which actors are linked with simulator kit to enable trainees to practice clinical procedures (Kneebone et al, In press). We are now exploring other procedures such as pap smear and bimanual vaginal examination. This abstract describes the development of scenarios and their implementation as formative assessments.

Research question

How feasible are hybrid simulations in supporting student learning in a gynaecology procedure and examination?

Methods

We used a 2 stage process:

Preparatory stage – 3 scenarios were developed in consultation with 3 actors, 2 obstetrician/gynaecologists and a communication specialist. Each scenario required students to perform a pap smear and bimanual examination and demonstrate other professional skills required in such encounters. Context varied in each scenario and all took place in simulated consultation rooms with a nurse and physical props (egs. patient histories, medical equipment etc.)

Pilot study - volunteer 5th year students rotated through each scenario as clinician and/or observer. Scenarios lasted 15 minutes with 5 minutes between.

Our research methodology gathered information from:

Faculty
-Written observations
Students
-Self-assessment – Rating forms, free text
-Peer-assessment – Rating forms, free text
-Group interview
Nurses
-Rating forms, free text comments
-Simulated patients
- Group interview
- Rating forms

All participants used the same rating form of 11-items including technical and professional skills and a 6-point scale for realism and difficulty (1=not at all to 6=highly).

Results

The preparatory stage resulted in the development of 3 scenarios. Actors reported feeling confident in communication and affective aspects of the scenario but had less confidence in accurately responding to intra-procedural cues. Mannequin legs proved clumsy and require further development for smooth and timely movement.

Fifteen students participated in the pilot. Students identified helpful aspects of scenarios, especially their realism - the complexity of the task, patients' expressions of emotions and some physical props. Students also identified aspects of scenarios that required improvement - some props, physical arrangement of furniture in the consultation rooms.

Nurses' comments on students' helpful behaviours related to patient communication – polite, friendly, talking as distraction during procedures and giving explanations, and to communication with the nurse – introductions, acknowledgement and clear instructions. Unhelpful communication with the patents included not listening, asking questions while looking busy or while not looking. Nurses reported that students did not appear to adjust their communication style to the patient's cues. Unhelpful behaviours included ignoring or patronising them.

Students' mean ratings of realism of scenarios ranged from 4.8-4.9 (SD=0.7-1.2) and difficulty from 2.9-5.1 (SD=0.7-0.8).

Conclusion

The study yielded extensive data which identified strengths and areas for development in hybrid simulations. The evidence suggests that this approach to formative assessments is valued by students enabling them to integrate a range of technical and professional skills in a safe setting.

References

Kneebone R, Nestel D, Yadollahi F, et al, Assessing procedural skills in context: an Integrated Procedural Performance Instrument (IPPI), *Medical Education In press*

COI statement: None

Research Abstract : 9

Effectiveness of Critical Care Education on Resident Physicians' Knowledge and Self-Efficacy Gains.

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Background: The Fundamentals of Critical Care Support (FCCS) course has been endorsed by the prestigious Leapfrog Group for Patient Safety[1] and incorporates the use of human simulators to gain hands-on practice and skills needed by health professionals during the first 24 hours of Intensive Care Unit (ICU) patient management. This study investigates the effectiveness of the FCCS course on improving residents' knowledge and self-efficacy in ICU patient care.

Methods: The FCCS course is offered at our institution to residents prior to their ICU rotation. Simulation training includes the use of task trainers (CVL placement, airway management, arrhythmia detection, and hands-on ventilator management). The course has been offered twice, and 18 residents have completed instruments for this study. Three educational outcomes were assessed: pre/post knowledge gains (i.e., items assess principles of airway management, hemodynamic monitoring, cardiopulmonary-cerebral resuscitation, etc.), pre/post self-efficacy gains in performing key procedures, and learner perceptions about the course (post).

Results: Descriptive statistics for knowledge, self-efficacy, and course evaluations are shown in Table 1. A paired-sample *t* test showed a significant increase in learners' knowledge scores at post test [t (17) = -4.0, $p < .01$]. There was a strong effect size for knowledge score gains ($d = .85$). Self-efficacy items showed significant improvement ($p < .001$), and a strong effect size ($d = 1.13$). Participants rated the course highly.

Table 1. Descriptive Statistics

	Pre	**Post**	**Effect Size**	***p***
Knowledge Test Scores	69.9 ± 12.1	80.2 ± 9.0	0.85	0.01
Self-Efficacy Score Totals	37.8 ± 10.4	45.8 ± 7.1	1.13	0.01
Course Evaluation[*]:				
Average evaluation rating for lectures	-	4.0 ± 0.8	-	-
Average evaluation rating for skill stations	-	4.4 ± 0.7	-	-

[*]Five-point Likert-type scale (1=poor, 2=average, 3=good, 4=very good, 5=excellent)

Conclusions: Although the FCCS course is widely believed to be a useful mechanism for educating health professionals in ICU critical care and ultimately for improving patient safety, little data exists in mainstream literature on this topic. Results of this study suggest the effectiveness of the FCCS course for preparing resident physicians for the ICU experience. Future work is needed to

connect these results to actual patient care.

References:

1. Society of Critical Care Medicine. FCCS course takes initiative in Leapfrog regions. *Crit Connections* 1(2):9, 2002.

COI statement: None

EFFECT OF TRACTION ON THE HEAD DURING VAGINAL DELIVERY ON BRACHIAL PLEXUS STRAIN.

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OBJECTIVE: Previous simulations have shown the effect of traction during delivery on brachial plexus (BP) strain modeled as a single element. We sought to determine the effect of head angle and traction force on BP strain, specifically at Erb´s point and the posterior cord (PC) in a multi-"filament" 3D model of the BP.

STUDY DESIGN: Using an instrumented biofidelic neonatal BP model, position-sensing system, and data acquisition system, we applied 0, 5, and 10 lbs of axial traction at 0°, 15°, 30°, 45°, and 60° in the downward direction, such that total traction force increases with angle (up to 20 lbs total for 10 lbs axial traction). For each simulation, we measured maximum anterior BP strain at Erb´s point and the PC. N=15. Data were analyzed with ANOVA, with $p<0.05$ considered significant.

RESULTS: As shown in the table, increasing traction force magnitude significantly increases strain at Erb's point (table) and PC (not shown), regardless of angle of delivery. The effect of magnitude and direction of force is significant at all traction force levels.

CONCLUSION: BP strain can be minimized at Erb's point and the PC by aligning the fetal head with the trunk and reducing traction during delivery.

Erb's Point Strain (%)

	0.0 lbs	**5.0 lbs**	**10.0 lbs**	***p*-value**
0°	0.0±0.0	1.0±0.8	2.4±1.9	<0.001
15°	1.6±1.0	2.1±0.8	4.7±4.2	<0.001
30°	3.2±2.4	4.2±2.3	5.6±3.3	0.005
45°	4.1±2.4	5.5±1.9	7.0±3.2	<0.001
60°	5.0±2.0	6.2±1.9	8.4±3.5	<0.001
***p*-value**	<0.001	<0.001	<0.001	

COI statement: None

Research Abstract : 45

Simulating Professional Challenges – Results of Two OSCE Stations.

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Recently professionalism training and assessment has received much attention. A multitude of strategies have been applied to help clinicians-in-training identify and deal with the sequelae of unprofessional behavior in themselves and colleagues. Special communication skills are needed to address such concerns with other team members. Objective Structured Clinical Exams (OSCEs) are being used to assess a broad range of competencies, and have been utilized in the Maimonides Medical Center Department of Pediatrics since 1999.

For the recent Communication Skills OSCE (given to all 1st year residents), and Culture OSCE (given to all 2nd year residents), we created two stations that focused on confronting a junior level trainee about unprofessional behavior. An instruction sheet and a brief video set the stage. In "Communication with a Colleague" participants had to confront a junior colleague who treated an ambulance driver disrespectfully. In "Pediasure Please!" they had to address a junior colleague who made racist comments about a patient to a medical student. The "standardized resident colleagues" were portrayed by two experienced standardized patients. OSCE participants had 10 minutes to complete the task and received immediate feedback from an observing faculty member and the standardized resident. A workshop that addressed some professionalism issues preceded the OSCE, and an in-depth group debriefing followed it.

Twenty-three 1st year residents completed "Communication with a Colleague" and 24 2nd year residents underwent "Pediasure Please!" All provided feedback on the station level of difficulty and educational value, as well as prior exposure to similar cases. Performance data was collected from observing faculty and standardized residents. Faculty evaluated general communication skills and station-specific professional behavior Items. In the first station the greatest variability in performance was found for requesting self-assessment, explaining the rationale and addressing specifics/not talking about generalities. In the second station the greatest range in performance was for stating professional standards, discussing differences, encouraging an active educational role and making a plan to avoid future such situations. Faculty and standardized colleagues provided global ratings on a 4 point scale (1=least, 4=most competent). There were significant differences between those ratings. In "Communication with Colleague" faculty rated residents higher (mean=3.0 versus mean=2.7; p=.0172). In "Pediasure Please!" the standardized colleague rated the residents higher (mean=3.2 versus 3.6; p=.0002).

In both stations faculty and standardized resident comments focused on remaining calm and neutral, building rapport and empathy early on, eliciting self-assessment, clearly stating concerns and professional standards but not lecturing, exploring emotions and reasons behind the unprofessional behavior and making a joint plan to prevent future unprofessionalism. Comments about the worst performers addressed similar but negatively framed competencies. Such information will help with future station development.

As we search for strategies to teach and assess professional behavior, we need to consider the opportunities simulations in OSCE stations can provide. One station per OSCE is clearly not be enough to evaluate someone's level of professionalism, but it provides a starting point for further discussion and may help empower trainees to take action when action is needed.

COI statement: None

Research Abstract : 12

Survey of Current Surgical Competency Assessment and a Possible Role for Virtual Reality Simulation.

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Background: To survey Ophthalmology Residency program directors and chairmen regarding current surgical competency assessment trends and opinions on the role of virtual reality surgical simulation.

Methods:

A 23 question survey was sent to the membership of the Association of University Professors of Ophthalmology (AUPO), which includes residency program directors and chairmen from 120 ophthalmology training programs in the United States and Canada. Questions encompassed current surgical assessment methods for residents, the respondent's virtual reality experience, and the respondent's opinions on virtual reality simulation

Results:

A total of 106 responses (44.2%) from 83 different residency programs (69.2%) were received. 86.7% of programs had functional wetlabs with 87.7% of respondents believing that wetlabs were beneficial. Experience with virtual reality simulation was limited to only having heard of the technology in 76.4% of respondents, 59.4% have seen a VR simulator, 34.9% have hands-on experience with VR simulator, and 2.8% use VR simulation in training. Those with higher familiarity scores had a stepwise more favorable opinion of VR with regards to patient safety, surgical curriculum, and awareness/acceptance by residents and faculty.

Conclusions

The community of ophthalmology educators is grappling with the issue of ACGME-mandated competency-based assessment in general and surgical competency appraisal tools in particular. The selection of assessment methods varies widely from program to program. Two different programs may use a similar number of assessment methods but completely different methods of assessment. This lack of uniformity can be corrected by implementation of objective, efficacious methods that are used across the board and serve as a standard of assessment among residency programs. VR is one such possibility of standardized assessment. While VR is considered relatively advanced technology, it is a rather new tool and its efficacy as a method of assessment has not been adequately gauged. Furthermore, awareness of VR is low as is knowledge regarding its possible incorporation into surgical curriculum. Perception of VR, familiarity with usage of VR, obstacles faced in incorporating VR into curriculum, and the issue of whether or not it is even a valid assessment tool were addressed in this study. The results of this survey support virtual reality as a means of delivering a surgical curriculum that is safe for the patient and accepted by residents and faculty. Conversely, cost is viewed as a detractor from full implementation. The acquisition of surgical skills and transferability of surgical skills gained through virtual reality simulation has not been substantiated according to the opinions of those surveyed. The results of the survey shed some light on the residency programs' current opinions of VR, but more definitive research is needed to prove the benefit of virtual reality in the operating room.

COI statement: None

Research Abstract : 4

A comparison of global rating scale and checklist scores in the validation of an evaluation tool to assess performance in the resuscitation of critically ill patients during simulated emergencies.

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BACKGROUND

Resuscitation of critically ill patients requires medical knowledge, clinical skills and non-medical skills, referred to as crisis resource management (CRM) skills. Most human errors that occur in medical crises are attributed not to deficits in medical knowledge, but rather to errors in non-medical skills such as CRM. Few opportunities currently exist to formally evaluate performance during resuscitation. Furthermore, no gold standard exists for evaluation of CRM performance. A pilot study using mannequin-based human patient simulation examined CRM performance during simulated emergencies, and examined the validity of a novel rating instrument in evaluating CRM performance - the Ottawa Crisis Resource Management Global Rating Scale (abbreviated as "Ottawa GRS"). Debate exists as to whether checklists or global rating scales are superior in formal evaluation of performance. In this study, a checklist for CRM performance and the Ottawa GRS were used to evaluate CRM performance. Both instruments were peer-reviewed, and divided into five categories of CRM skills. The Ottawa GRS provided scores for each category along a seven-point Likert scale, and also included a separate score for overall performance. The CRM checklist provided measurements of 15 individual items for the five categories of CRM, with a cumulative score of 30 points (two points per item).

METHODS

First and third-year residents participated in two simulator scenarios, each recreating emergencies commonly observed in acute care settings. Using edited video recordings of each session, three blinded raters evaluated resident performance with both the Ottawa GRS and the CRM checklist. Validity of each rating instrument was measured on the basis of content validity, response process, internal structure and response to other variables. Response to variables was measured in this study by the response to the variable of level of training. T-test analysis of Ottawa GRS and CRM checklist scores were conducted to examine response to level of training. Internal structure was measured in part by measures of inter-rater reliability. Intra-class correlation coefficient (ICC) scores were used to measure inter-rater reliability for both scenarios.

RESULTS

A total of 32 first-year and 28 third-year residents were recruited into the study during a 24-month period. Both the Ottawa GRS and the CRM checklist demonstrated the ability to discriminate between levels of training in all categories examined ($p < 0.0019$ to $p < 0.0001$). This difference was noted with all raters, and with each scenario. No statistically significant difference in resident performance was noted between the first and second scenario. Intra-class correlation coefficient (ICC) scores for Ottawa GRS overall performance scores were 0.590 and 0.613 for each scenario. ICC scores for CRM checklist cumulative scores were 0.633 and 0.545 for each scenario. All raters in the study indicated a strong preference for the Ottawa GRS due to ease of administration and scoring. Raters also indicated the Ottawa GRS was superior in providing the opportunity to rate overall performance.

CONCLUSIONS

Both the Ottawa GRS and CRM checklist demonstrated the ability to differentiate CRM performance based on levels of training. Both instruments demonstrated acceptable measures of inter-rater reliability. The Ottawa GRS was strongly preferred by raters for its ease of use and administration. The Ottawa GRS appears well-suited as a formal evaluation tool to rate physician performance in CRM during simulated emergencies.

COI statement: None

What is Preferable Type of Macrosimulation for Introductory Advanced Life Support Course (IALS) to Undergraduate Medical Students?

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Introduction : Onsite instructor-student interactive simulation with contemporaneous verbal debriefing (interactive type) has been adapted in current various advanced life support courses. Full-scale, realistic patient simulation with video-assisted debriefing (realistic type) is also emerging as a training technique in advanced life support courses. The purpose of the study was to investigate which type of macrosimulation is more effective and preferable for Introductory Advanced Life Support (IALS) course to undergraduate medical students.

Methods : A full-day, IALS course was developed for third-year medical students who attended at a four-weeks, Introduction to Clinical Medicine (ICM) course. The students were assigned to one of three training days. The course was organized in five stations; ALS quiz, ALS drugs and equipments, ALS core skills, microsimulation, and macrosimulation with two scenarios. After an introduction to the course and pretest review, small group of students shifted from one station to another. Interactive type was applied on the first day macrosimulation, whereas realistic type was applied on the second and third day that administered by trained facilitators with core performance checklist. The third day course was different from the second day course in manner of rotating stations. At the end of course, students were tested with focused multiple choice questions related to the course contents and learning objectives. As well, students evaluated the course and two types of macrosimulation using questionnaires with a five-point scale and were solicited written comments. Two blinded investigators reviewed the recorded movie files of each macrosimulation team using core performance checklist with scoring system and assessed team performances.

Results : One hundred eighteen students participated in the course and were assigned (Day 1, group A, n=40; Day 2, group B, n=38; Day 3, group C, n=40). There was no significant difference in scores of posttest among three groups (group A, 67.6±10.8; group B, 67.6±10.1; group C, 65.8±9.8, p=0.68). Students' responses to the course were very positive. Especially, overall satisfaction and matching of learning objectives were highly valued (4.44±0.78 and 4.25±0.74, respectively) and some students pointed out that time allocated for macrosimulation was relatively short and expected to have more experience on it as comments. There were no statistically significant differences in evaluation to six aspects of macrosimulation among three groups. However, students viewed that realistic type was more valuable in realistic experience like patient care and less valuable in team communication training than interactive type. There was no significant difference in overall team performance scores whether microsimulation was provided before realistic type of macrosimulation or after [scenario 1, before and after, 25(17-30) and 22.5(16-35), p=0.352; scenario 2, before and after, 22.5(17-30) and 24(10-31), p=0.684]. However, many students commented to spend more time on microsimulation before attending macrosimulation.

Conclusion: Both onsite instructor-student interactive simulation with contemporaneous verbal debriefing and full-scale, realistic patient simulation with video-assisted debriefing in introductory advanced life support course offer a valuable learning experiences to third-year medical students with its own advantages.

COI statement: None

Research Abstract : 25

The Imperial College Feedback and Assessment System for procedural skills.

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Background

This research presents an integrated, web-based assessment and feedback system for procedural skills, using simulated scenarios. Clinical procedures are a key component of practice for many healthcare professionals. Traditional approaches to simulation based procedural assessment use benchtop models. An assessor is usually present, completing paper rating forms during the procedure. This does not reflect the realities of clinical practice (where clinicians may have to perform procedures without direct supervision), and may also produce a Hawthorne effect. Clinicians performing procedures on conscious patients must integrate technical skills, communication and professionalism. Benchtop simulators alone cannot recreate holistic practice, especially with challenging clinical situations. These may include patients who are disabled, angry, distressed or unable to speak the clinician's language. Our group has developed an Integrated Procedural Performance Instrument (IPPI) for assessing procedural skills. A panel of 8 realistic simulated scenarios combines simulated patients (actors) with inanimate models to recreate common and important clinical situations. These include urinary catheterisation, venepuncture, intravenous infusion, injections, inhaler use and skin suturing. Detailed evaluation has shown the perceived value of IPPI to be high. Timely, focused feedback is crucial to effective learning but is often lacking from procedural assessments. Feedback from IPPI sessions comes from three perspectives – the clinical assessor, the simulated patient and the learner themselves. However, participating in a series of demanding scenarios can generate a higher feedback load than learners are able to absorb at the time. This project uses technology to provide detailed, learner-controlled feedback. Methods Working with a software development partner (Librios Data Management Systems), we have developed a computer-based assessment. The Imperial College Feedback and Assessment System (ICFAS) combines commercially available videosurveillance cameras and networked videomonitoring technology with a custom designed on-screen assessment program. Assessors observe and rate scenarios remotely, using laptop computers (controlling control camera view with on-screen controls). Procedures are rated on-screen, using global ratings and free text. Learners and simulated patients (SPs) use handheld computers to input performance data, and SPs also provide spoken feedback to camera after each scenario. ICFAS integrates these multiple data sources and generates a secure, web-based feedback site. Within hours of an IPPI session, each participant can access graphical summaries and detailed information about their individual performance, and review their videorecorded scenarios. Results IPPI sessions with 148 participants have generated more than 1,240 scenario episodes. Participants include undergraduate medical students, qualified doctors and non medically qualified healthcare practitioners. Evaluation has included observation by our research team, questionnaires and group interviews conducted by an independent qualitative researcher. Overall results have been highly positive and will be summarised in the presentation. Technical issues in the early stages of the project led to progressive refinement of the ICFAS system and will be discussed in further detail. Conclusions ICFAS offers a feasible and effective approach to procedural skills assessment. Multisource feedback can be provided within hours of a complex IPPI. This technology places the locus of control for accessing feedback with the learner and offers significant benefits for formative assessment. Remote assessment offers potential for non-intrusive observation and recording.

COI statement: None

Research Abstract : 35

A Comparison of Clinical Reasoning Abilities in Senior Baccalaureate Nursing Students: Authentic Clinical Experience versus Human Simulations.

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Background: Fostering clinical reasoning in undergraduate nursing students is a desired outcome to help graduates make an easier transition into the practice role. The pedagogical strategies that support clinical reasoning in the practice arena often times can be duplicated in the clinical laboratory. The aim of this project was to promote metacognitive and cognitive skills used during clinical reasoning with human simulator scenarios and determine if clinical reasoning promoted during human simulator scenarios differed from clinical reasoning used in authentic clinical experiences. Clinical reasoning during both the clinical and human simulator experiences was documented and evaluated by the Outcome-Present state Test Model (OPT) of Clinical Reasoning (Pesut & Herman, 1999).

Method: A pilot project was conducted during a 14 week clinical course with 44 senior nursing students who rotated through acute care medical/surgical units. Students were divided into groups of 4-5 and assigned to a 3 hour clinical laboratory experience working with human simulator guided scenarios. Four different scenarios were rotated between the groups so the students could not anticipate their assignments. The human simulator by Laerdal © was used to provide scenarios that incorporated all the simulator capabilities as well as opportunity to perform basic nursing care skills. Clinical reasoning was documented on OPT Model Forms and evaluated by an OPT Model Rating Scale, and then compared to scores from OPT Model Forms completed during the semester during authentic clinical experiences.

Results: The data included 44 OPT Model Forms from authentic clinical experiences and 44 OPT Model Forms from human simulator experiences. While there was a total of 62 possible points for the rating scale, the total mean rating scale scores for the clinical experiences and human simulator experiences were 48 and 47 respectively ($t = -1.321$, $p = .194$) A paired sample t-test comparing scores from both OPT Model Rating Scales for each section of the model by student revealed $t = -.680$, $p = .504$. The OPT Model Rating Scale scores for the human simulator experience were higher for: recording laboratory data; listing interventions; connecting present state, outcome state and keystone diagnoses; and judgments regarding tests. Student evaluations revealed that the scenarios “allowed them to think for themselves”, “challenged clinical decision making skills”, and “made you work in a group like the real world”. Some students related that “it was hard to perform as you would in real life because he was not real”, working in pairs would have been better, writing an OPT Model on a mannequin did not reflect what we learned”, and we could get this experience in the actual clinical setting”.

Conclusions: A future project using the human simulator with all levels of nursing students will include more widespread use of scenarios that correlate with didactic content throughout the clinical nursing courses. The OPT Model of Clinical Reasoning reveals to the student and faculty the priorities of care irregardless of the setting. The combined use of metacognitive and cognitive skills for human simulation scenarios may impact on efficient thinking in actual clinical settings and on other forms of student evaluation.

COI statement: None

Research Abstract : 29

Adaptive leadership processes in anesthesia teams.

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Background

In order to ensure adequate patient care it is essential that anesthesia teams coordinate and communicate effectively, especially during critical situations. The work of anesthesia teams is characterized on the one hand by routine procedures and long- lasting monitoring and on the other hand by uncertainty, complexity and rapidly shifting priorities. The leader plays a crucial role in terms of team coordination. However, little research has been conducted on the topic of leadership in anesthesia teams. In this study, we aim to increase our understanding of leadership in anesthesia teams by investigating links between leadership behavior and team performance. Specifically, we describe how different leadership patterns (task vs. structure oriented) influence team performance. Based on our previous research we hypothesize that teams, which adapt their coordination processes to the situational demands, will have higher levels of performance than those which do not.

Adaptive leadership means that leadership behavior will change depending on the situation and other coordination mechanisms. We assume that in a non-routine event, which leads to an increased workload, a directive leadership style is more effective. Leadership behavior can also be influenced by other coordination mechanisms. During work phases with high standardization where the rules and work process are clear to everyone, less leadership is required. Furthermore, adaptive leadership also means that not only the leadership behavior but also who takes on the leadership role can vary. We assume that the role of the leader may not only be taken on by the formal leader (responsible physician) but by other team members as well.

Methods

The current study is part of a comprehensive research project and relies on video recordings of 15 anesthesia teams working in a simulated setting. The simulation includes an induction of general anesthesia with occurrence of unforeseen (non-routine) events. Together with expert assessments of the appropriateness of the actions taken, the speed of adequate team reaction to these critical events is the measure used to assess technical team performance.

The observed leadership behaviors are categorized in two main categories:

- task-oriented (e.g. information transmission)
- structuring (e.g. assigning tasks)

Results

Preliminary results show that leadership behavior changes depending on the work load. The amount of leadership required is almost twice as high in a non-routine event as in the preparation phase in which the workload is low. Furthermore, results confirm the assumption that in a critical event it is necessary for a formal leader to coordinate the activities in a clear and direct manner. While in phases with a lower work load or in well known situations leadership is shared between the resident and the nurse, the formal leader takes on the main part of leadership in phases in which the work load is high.

Conclusions

The results will further the scientific understanding of team coordination, but will also provide the basis for practical measures for team and leadership training.

COI statement: None

Research Abstract : 55

Computer-Based Simulation of Cardiovascular Stent Implantation.

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BACKGROUND

Percutaneous stent implantation is the most common intervention for the treatment of a stenosed artery. Intervention strategy, including stent selection, and inflation pressure, is typically determined by clinician's experience. Restenosis, the most common complication from stenting, has been shown to be strongly related to the mechanics of the intervention.

In this work, a finite element model for simulating stent implantation is presented and validated using clinical data. The goal of this numerical tool is to assist clinicians in the selection of appropriate intervention strategy for a specific patient.

METHODS

A finite element analysis software developed at IMI is used to solve balloon angioplasty and stent implantation mechanics (Laroche 2006). The software computes the balloon/stent/artery interaction and large deformations that occur during device deployment inside a stenosed artery. It predicts the artery patency and the stress distribution in the arterial wall, for a specific device and inflation pressure. The friction between the balloon, stent and arterial wall are also computed. The accumulated friction work is used as a predictor of endothelium denudation, a known triggering factor of restenosis. The artery is modeled with a nonlinear anisotropic elasto-plastic constitutive model. The simulation starts with the stent mounted around the pre-wrapped balloon and positioned inside the artery. Once the device deployment is completed, the balloon is deflated and the elastic recoil of the stent and artery is predicted.

Apart from improvements in constitutive models, the major contribution of this work is the in-vivo validation of the model. This was done using pre and post IVUS images on a patient who underwent stent implantation on the mid-LAD coronary artery. The final artery patency, as predicted by the proposed model, was compared to the post stenting images. Figure 1 shows the balloon/stent model into the artery.

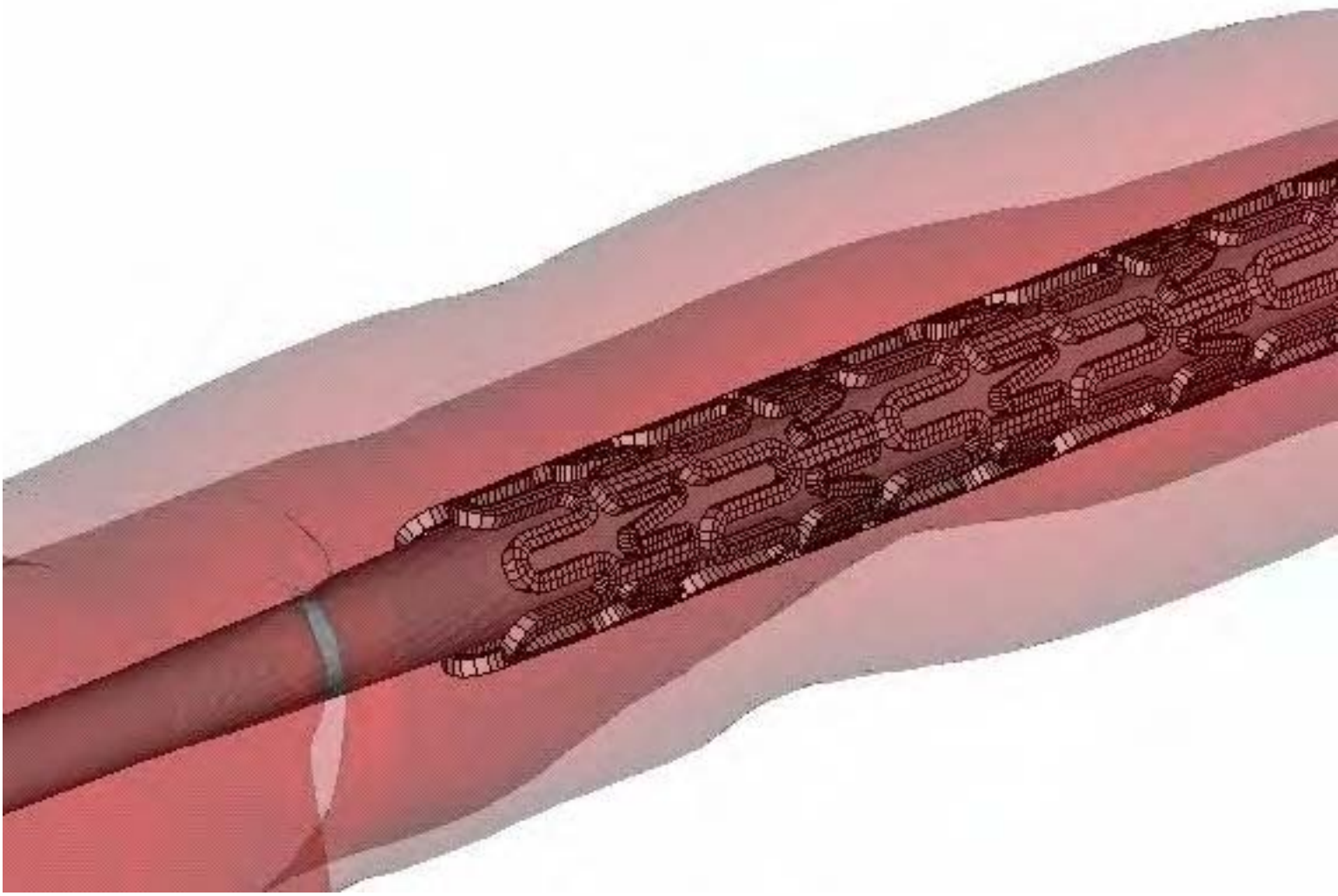
RESULTS AND CONCLUSION

The potential of the model to accurately predict the post intervention artery patency is presented. The effect of the device properties, including the mechanical properties of the stent and the artery is discussed.

REFERENCES

Laroche, D. et al (2006) *Biomedical Simulation: 3rd Int. Symp, ISBMS*, Zurich, Switzerland.

COI statement: None



Research Abstract : 37

Effect of a simulation-based program in common anesthesia events during orientation in an anesthesia training program.

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Background: First year anesthesia residents (CA-1) enter highly stressful work and learning environments with minimal preparation for new decision-making responsibilities. Simulation-based learning leads to the building of generative skills resulting in enhanced self-efficacy. The aim of the study was to analyze the effect of simulation-based teaching of common clinical intraoperative scenarios on the resident's self-ratings of confidence. Additionally, we surveyed the trainees for an assessment of the fidelity and usefulness of the program.

Method: A prospective study was performed with the CA-1 residents during a 21 day period during the first month of training. The residents initially completed a precourse self-confidence survey consisting of 25 questions, scaled 1 to 10 with 1 = no confidence to 10 = fully confident. They received simulation-based instruction in the conduct of anesthesia and management of routine intraoperative problems (hypoxia, hypotension, and hypertension) using SimMan® (Laerdal Medical, Wappingers Falls, NY). The residents received 3 sessions lasting 60 minutes each. Upon completion of the course, the residents completed an identical postcourse confidence survey. At the end of the session, residents completed a survey to assess their perceptions of simulation-based education, the relevance and face validity of the clinical scenarios, and the effectiveness of the sessions (23 questions on a 1 to 5 Likert scale, 1 = strongly disagree to 5 = strongly agree). Both the mean confidence level for each resident as well as the group's cumulative mean confidence levels were determined. The group data were analyzed by paired Student's t test. The individual questionnaire data was analyzed by Wilcoxan signed rank test for paired data. Statistical significance was defined as $P < 0.05$. The evaluation surveys were analyzed for frequency distributions and data reported as mean values as well as percentage of respondents who agreed or disagreed with the statements.

Results: All 23 trainees completed the course and surveys. The cumulative mean trainee confidence measure (N= 23) increased significantly ($P <0.001$) from a precourse value of 5.72 + SD 2.24 to a postcourse value of 6.95 + SD 1.94. The mean confidence measures increased in 21 of 23 residents. With respect to the individual survey questions, both the cumulative mean and individual confidence scores increased in 24 of 25 questions after the sessions. The sessions were felt to be sufficiently realistic (4.32 + 0.65 [mean, S.D.]) and the fidelity of the simulations was rated highly by 91% (Likert scores > 4) of the residents. The sessions reinforced clinical concepts in the didactic program (4.32 + 0.84) and increased confidence (4.00 + 0.69) to take care of patients in 86% of the trainees (Likert scores > 4). All of the residents indicated that simulation-based teaching should be mandatory during the orientation (4.64 + 0.49).

Conclusions: Completion of the simulation-based course led to a significant ($P <0.001$) improvement in the confidence level of the trainees. The program was well received by the residents, and they expressed a strong desire to continue this type of training throughout their residency.

COI statement: None

Research Abstract : 2

Modeling versus self-directed simulation with debriefing, is there a difference?

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Background

The clinical experience provided by graduate education of Advanced Practice Nurses (APN's) is "education by random opportunity" and difficult to regulate. If APN's actually do experience an emergency in the clinical setting, according to Bandura (1977), their future behavior will model their clinical experience. The purpose of this study is to compare knowledge, self-efficacy, and acquisition and application of technical and behavioral skills between students who have been exposed to high-fidelity simulation using self-directed-team scenarios with or without debriefing versus students who have been exposed to simulation using instructor-modeled scenarios.

Method

This prospective, randomized, controlled, study was conducted between January, 2006, and May, 2006, at the University of Texas at Arlington School of Nursing (UTASON). A convenience sample of nurse practitioner students enrolled in the spring Pediatric Management course participated in this study. Students were randomly assigned to one of three groups. Group A, the control group, received lecture only (n=5), group B (n=5) participated in high fidelity simulation using a *self-directed-team* scenario *and facilitated debriefing, and* group C (n=6) participated in high fidelity simulation using an *instructor-modeled* scenario.

Results

There were no differences in demographic characteristics between the groups. The length of time required to apply oxygen was not statistically significant (Group A = 2.5 minutes, Group B= 1.4 minutes, Group C= 1.3 minutes, p = .21). There was no statistical difference in their ability to gather information and perform a physical assessment. However, there was a statistically significant difference between the groups in their ability to make an accurate diagnosis (p= .03; A vs. B, p = .02, A vs. C, p = .09) and to initiate the appropriate therapy (p = .006; A vs. B, p = .011, A vs. C, p = .03). Behavioral assessment showed statistically significant differences between the groups in all ten components measured. A strong correlation was observed between the overall score of the Behavioral Assessment Tool and the Self-Efficacy Score (time 1: p = .003, R^2= .7; time 2: p = .009, R^2 = .64; time 3: p = .02, R^2 = .6) indicating that 60-70% of the variance in team behaviors may be explained by the confidence of the team members. There were significant differences between the groups noted in the self efficacy at the three times (time 1: p = < .001; A vs. B, p = .001, A vs. C, p = .002, time 2: p = .005; A vs. B, p = .051, A vs. C, p = .005, time 3: p = .030; A vs. B, p = .054, A vs. C. p = .053).

Conclusions:

There were no statistically significance differences between the three groups when knowledge was assessed over three time periods, however, there were statistically and clinically significant differences between the groups on confidence, technical, and behavioral skills validating that measuring knowledge alone is inadequate.

COI statement: UT Arlington School of Nursing is a Laerdal Center of Excellence.

Research Abstract : 68

A Simulation Information Management System for use in large scale simulation centers.

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The Peter M. Winter Institute for Simulation, Education and Research (WISER), University of Pittsburgh, Pittsburgh, PA

The Simulation Information Management System (SIMS) developed at the Peter M. Winter Institute for Simulation, Education and Research (WISER) has allowed the institute to continue to operate at a high level of efficiency and effectiveness. SIMS integrates aspects of day to day operations, interactions with students and instructors, dissemination of course curriculum, and collection of course related information with research coordination and data handling. SIMS is designed with the scalability to operate and meet the needs of a large scale, active simulation center. Functionally SIMS is divided into three major systems including a Facility Management System (FMS), Learning Management System (LMS) and a Research Management System (RMS). The three systems are integrated into one operational infrastructure. This integrated system is available across the web and stores its data into a centralized Standard Query Language (SQL) database. It is designed so that multiple independent simulation centers can operate from the same hardware and software and yet have a unique look and custom courses. The FMS provides for the scheduling of rooms as well as the assignment of students and instructors into classes. Once individuals are assigned to a class they are automatically given access to course material, and via email, are prompted to complete assignments and reminded to report for their classes at WISER. Standard reports show student participation, instructor participation and category of participants based on their domain of practice, or practice location. Individual users of the system can print on-demand reports. For example to compile annual teaching summary activity reports, an instructor can create a report for time spent teaching along with access to the evaluations provided by the students. The LMS is a SCORM 2004 compliant course distribution system. It hosts rich multimedia content, customized surveys, evaluations and quizzes. Users can create and manage their own accounts. Directors of each course can easily manage their course roster independent from WISER's administrative staff. The LMS also provides for significant instructor support and the ability to create on-line instructor curriculum, which helps to ensure that courses are taught in a uniform manner. Student progress and task completion is tracked and is available in real-time. The RMS stores the data from quizzes, surveys, evaluations, student's demographics as well as log files collected from simulation equipment during simulation sessions. It automatically de-identifies the data to facilitate research efforts. Data can be extracted from the relational database to generate quality assurance reports as well as exportation from SIMS directly to statistical software packages for research analysis. The multi-center ability of SIMS makes the system a natural catalyst for multi-center research projects. SIMS has allowed WISER to grow efficiently in the past year. Over the last year the number of students has increased by 31% without a significant increase in administrative staffing. SIMS allows the end users to manage their educational objectives and data with minimal oversight and support of the WISER staff. Finally, as a central repository of nearly all data collected at WISER, it is a significant resource for many research projects.

COI statement: None

Research Abstract : 24

Virtual Patients Reduce Anxiety and Enhance Learning When Teaching Medical Students Sexual-History Taking Skills.

Darren Mack[1], Adeline Deladisma[1], Thomas Bernard[1], Christopher Oxendine[1], Benjamin Lok[2], D. Scott Lind[1]
[1]Medical College of Georgia, Augusta, GA, [2]University of Florida, Gainesville, FL

Background: Taking a complete sexual history is anxiety-provoking for both students and patients. Our previous work validates the use of virtual patients (VP) to teach and assess content items related to history-taking and basic communication skills. The purpose of this study was to determine if a virtual scenario can be used to prepare students for taking a complete sexual history with real or standardized patients (SP).

Methods: After receiving baseline instruction on taking a complete sexual history, medical students at the Medical College of Georgia (N=19) were then asked to take a sexual history from either an SP alone (Group 1, N=9) or a VP immediately followed by an SP (Group 2, N=10). In the virtual scenario, a life-sized VP was projected on the wall of an exam room (Figure 1). A virtual instructor (VI) provided the student with background information and the goal of the virtual scenario. Students conversed with the VP via a commercially available speech recognition engine. All participants completed exit survey to assess knowledge, attitudes, and practices regarding sexual history taking. During the SP and VP interaction, blood pressure and heart rate were recorded every two minutes using non-invasive monitors. Data=Mean ± SD. Data analyzed by Students t-test.

Results: In their initial interaction, students taking a sexual history from a VP demonstrated less change in systolic blood pressure (ΔSBP) than students taking a sexual history from an SP (Table 1). There was no difference in student anxiety or preparedness for taking a sexual history at baseline or post interaction when comparing the two groups. Student comments regarding the VP interaction included “It was good to have a practice run with the VP before I saw a real person,” and “Good for practicing questions ….”

Conclusions: Medical students taking a sexual history for the first time demonstrate less anxiety as measured by Δ SBP when interacting with a VP versus an SP. Virtual patients provide a safe and secure environment with the opportunity for repetitive practice for medical students to learn anxiety-provoking tasks such as sexual history-taking before interacting with a real or standardized patient.

COI statement: None

Figure 1- Virtual Patient Scenario

Table 1- Comparison of VP & SP Interactions

Measure	Group 1 (SP only)	Group 2 (VP → SP)	p-value
Pre-anxiety[1]	3.00 ± 1.12	3.20 ± 0.63	NS
Pre-preparedness	1.55 ± 0.73	1.60 ± 0.84	NS
Post-anxiety	4.11 ±0.60	4.10 ±0.99	NS
Post-preparedness	4.33 ± 0.50	4.20 ± 0.92	NS
Δ SBP max[2]	18.88 ± 6.03	5.11 ± 10.30	< 0.05
Δ SBP mean	9.31 ± 5.98	- 0.47 ± 10.02	< 0.05
Δ HR max	14.63 ± 10.71	6.44 ± 10.56	NS
Δ HR mean	7.76 ± 8.24	- 0.47 ± 14.52	NS

[1]Five-point Likert-type scale (1=strongly disagree, 5=strongly agree).
[2]Maximum or mean change in systolic blood pressure (SBP) and heart rate (HR) from baseline.

Research Abstract : 19

The Anesthesiologits in the Code Team - A Two-Way Street.

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Background

The use of simulation in medical education is becoming more frequent both in undergraduate and residency programs.[1] The interaction of instructor and trainees allows not only for the transfer of knowledge, but also improves our ability to identify areas where clinical skills or experience may be lacking.[2] The feedback from these sessions can provide information and insight not achieved or appreciated by other methods. We present here an example how interaction with our residents in the simulator lab has led us to better understand when, and perhaps more importantly, where our residents are learning some of the basic skills expected of all anesthesiologists.

Methods

The residents were scheduled to attend a four-hour training session in our High Fidelity Human Patient Simulator Lab. The session involved scenarios requiring the use of a defibrillator. The teams were composed of three residents, one from each year of training. At the end of the session, the residents were asked to complete an evaluation. In the evaluation, we also asked them to indicate their previous experience with using a defibrillator either on simulators or on patients. The data were collected and analyzed using chi-square to determine whether the level of training was related to the difference in rates of performing defibrillation on patients. A p value of < 0.5 was considered significant.

Results

A statistically significant difference (using chi-square analysis) was found between the groups ($p<0.001$). Only 10% (3/30) of CA-1 residents reported having performed defibrillation on patients. Among CA-2 and CA-3 residents, this number increased to 25% (7/28) and 54% (13/24) respectively.

Conclusions

Beginning in CA-2, the resident covering the PACU also carries the code beeper. From our debriefing sessions in the simulator lab, it became apparent that the increase in clinical exposure to defibrillation was occurring mostly outside the operating room, usually during participation in codes throughout the hospital. While including the anesthesiologist in the code team obviously improves airway management, it also provides an opportunity for our residents to gain clinical experience in skills not routinely done in the OR. Through our simulation program, we realized that inclusion of our residents in the code team is a two-way street and helps to augment their training as perioperative physicians. Additionally, these experiences should be documented in order to show completion of ACGME required competencies.

References

1. Good ML. Patient simulation for training basic and advanced clinical skills. Med Educ 2003; 37(s1): 14-21.

2. Shwid HA, Rooke A, Carline J, Steadman RH, Murray WB, Olympio M, Tarver S, Steckner K, Wetstone S: Evaluation of anesthesia residents using mannequin-based simulation. Anesthesiology 2002; 97:1434-44

COI statement: None

Validity and Reliability of a Human Factors Rating Scale to Assess Performance of Obstetrical Teams using High-Fidelity Simulation.

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BACKGROUND: The National Confidential Enquiry into Maternal Deaths identified 'lack of communication and teamwork' as a leading cause of substandard obstetrical care. The National Steering Committee on Patient Safety in Canada recommended the creation of professional development curricula for multidisciplinary teams. We used high fidelity simulation to present obstetrical scenarios for team assessment.

METHODS: Obstetrical nurses, physicians, and resident physicians were repeatedly assigned to teams of 5-6, each team managing 1 of 4 scenarios. Each person participated in 2-3 scenarios with differently constructed teams. Participants and thirteen external raters rated the teams' performances using a Human Factors Rating Scale (HFRS), an adaptation of the Operating Room Management Attitudes' Questionnaire (ORMAQ)[1] and a global rating scale (GRS). Inter-rater reliability was determined using intra-class correlations and Cronbach's alpha. Analyses of variance determined the reliability of the two measures, and effects of both scenario and rater profession (RN vs. MD) on scores. Pearson product moment correlations compared external to self-generated assessments.

RESULTS: After REB approval, 16 nurses, 6 obstetricians, 6 anesthesiologists and 6 residents participated in 12 simulations, producing 71 HFRS and GRSs. Across the 13 external raters, the single-rater intra-class correlation coefficient (ICC) for the HFRS was 0.316, suggesting that a single rater's scoring of the 12 performances was not highly predictive of any other individual rater's scoring. The 13-rater ICC for the HFRS was 0.857. The single rater ICC for the GRS across the 13 raters was higher at 0.410, with a 13-rater Cronbach's alpha of 0.900. The Pearson Product Moment Correlation between the HFRS and the GRS scores for the 12 scenarios was 0.934. Analysis of Variance (ANOVA) for both the HFRS ($F_{3,36}$=13.09, p<.001) and GRS ($F_{3,36}$=22.38, p<.001) revealed a significant difference in performance ratings among the four scenarios.

The 6-rater Cronbach's alpha for team members' self-assessment scores was 0.15 for the HFRS and 0.74 for the GRS. This suggests that the average of 6 team members' ratings was moderately stable for the GRS, but was problematically low for the HFRS. Similarly, analysis of variance revealed no significant difference between scenarios for HFRS scores ($F_{3,67}$=0.36, ns), but a borderline difference for GRS ratings ($F_{3,67}$=2.92, p<0.05), indicating the GRS, but not the HFRS, identified some scenarios as more difficult than others. Analysis of scores by profession indicated that nurses gave significantly higher team scores than physicians on the HFRS (F=6.26, p<.05), but not on the GRS (F=2.96, ns). An analysis of profession-specific sub-scores on the HFRS revealed no interaction between profession of rater and profession being rated (F=1.98, ns). Pearson's correlation between self-generated scores and externally generated scores across the 12 performances was 0.24 for the HFRS and slightly higher at 0.44 for the GRS.

DISCUSSION: In this study the HFRS showed little or no ability to discriminate team performances. The GRS shows promise as a summative but not formative assessment tool. It is necessary to develop a domain specific behavioral marking system for obstetrical teams.

1. Bailliere's Clinical Anaesthesiology 1996;10:277-95

COI statement: None

Research Abstract : 23

Reproducibility of a model driven simulator and sensitivity to initial conditions.

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Anesthesia Service, VA Palo Alto HCS, Department of Anesthesia, Stanford University School of Medicine, Palo Alto, California

Background

An essential assumption to the use of model-driven simulators is that the devices generate consistent and reproducible results. While research has looked at improving the fidelity, validity, and clinical application of human patient simulators, few independent studies have rigorously tested the reliability of the embedded models.

The METI-HPS was selected for its widespread use and as a standard model-driven simulator. We hypothesized that when the models were run on the workstation alone (disconnected from the tower and mannequin), the simulator should generate identical data each time the same initial state and exact sequence and timing of an action was followed. An "instantaneous" blood loss was selected as a perturbation with easily recognized effects on hemodynamics.

Methods

The METI HPS (Version 6.3,MAC OS 10.2.8) was used in the "disconnected state." A "test" consisted of five procedurally identical runs:

Tests 1,2: Both Standard Man (SM) and Orthostatic Granny (OG) were selected from the patient menu for simulator runs of two minutes.

Tests 2-6: SM was subjected to blood loss of 300, 900, 1500, 2400, or 3000 ml at 15 or 16 seconds (consistent within a test) and run for two minutes.

Tests 7-11: OG was subjected to blood loss of 150, 750, 1500, 2250, 3000 ml and run for two minutes. The logs of key vital signs for each run were analyzed using EXCEL.

Results

Overall, several types of variations were found:

a lack of reproducibility of starting baseline values including CVP, partO2 with some markedly atypical curves.

high-amplitude "cycling" (e.g. for CVP) – before blood loss the curves of different runs in a test were completely superimposed; after blood loss the curves diverged despite identical amount of blood loss.

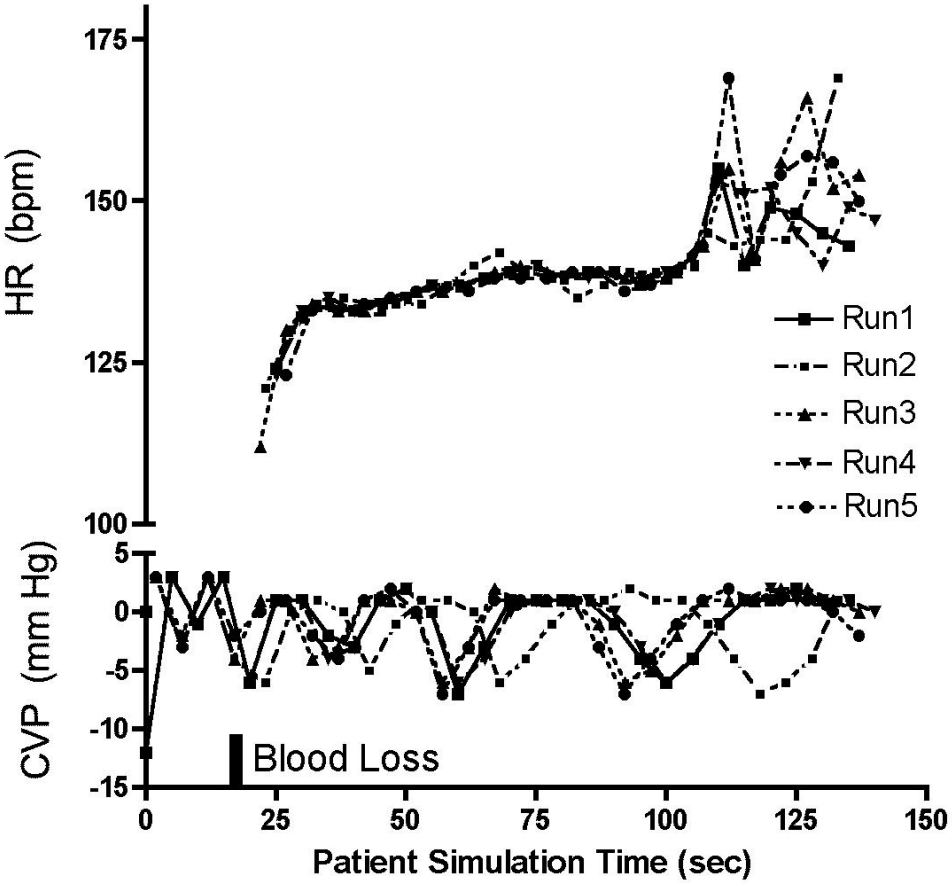
emergence of chaotic divergent values after an apparent steady state (e.g. heart rate see Figure 1).

Conclusions

The lack of reproducibility of baseline values and hemodynamic responses of the simulator can create further challenges in validating technical and behavioral scores of participants in training and exam situations.

Figure 1: CVP and heart rate from the OG/750 ml blood loss test.

COI statement: None


175
150
125
100
HR (bpm)
Run1
Run2
Run3
Run4
Run5
5
0
-5
-10
-15
CVP (mm Hg)
Blood Loss
0
25
50
75
100
125
150
Patient Simulation Time (sec)

Research Abstract : 26

Durability of Non-Technical Skills Following Crisis Resource Management Training.

Viren Naik, Georges Savoldelli, Deven Chandra, Hwan Joo
St. Michael's Anesthesia Research into Teaching (SMART) Simulation Group, Department of Anesthesia, University of Toronto, Toronto, Ontario, Canada

Background: Non-technical skills, such as task management, team working, situation awareness and decision making, are vital to anesthesia crisis resource management.(1) These skills are often taught using a high fidelity patient simulator. Previous studies have demonstrated improvement in non-technical skills following a debriefing of a simulated crisis, and sustained skills two months after the training session. This same study showed these skills are not learned through clinical duties exclusively.(2) We conducted this study to examine the durability of teaching non-technical skills over time.

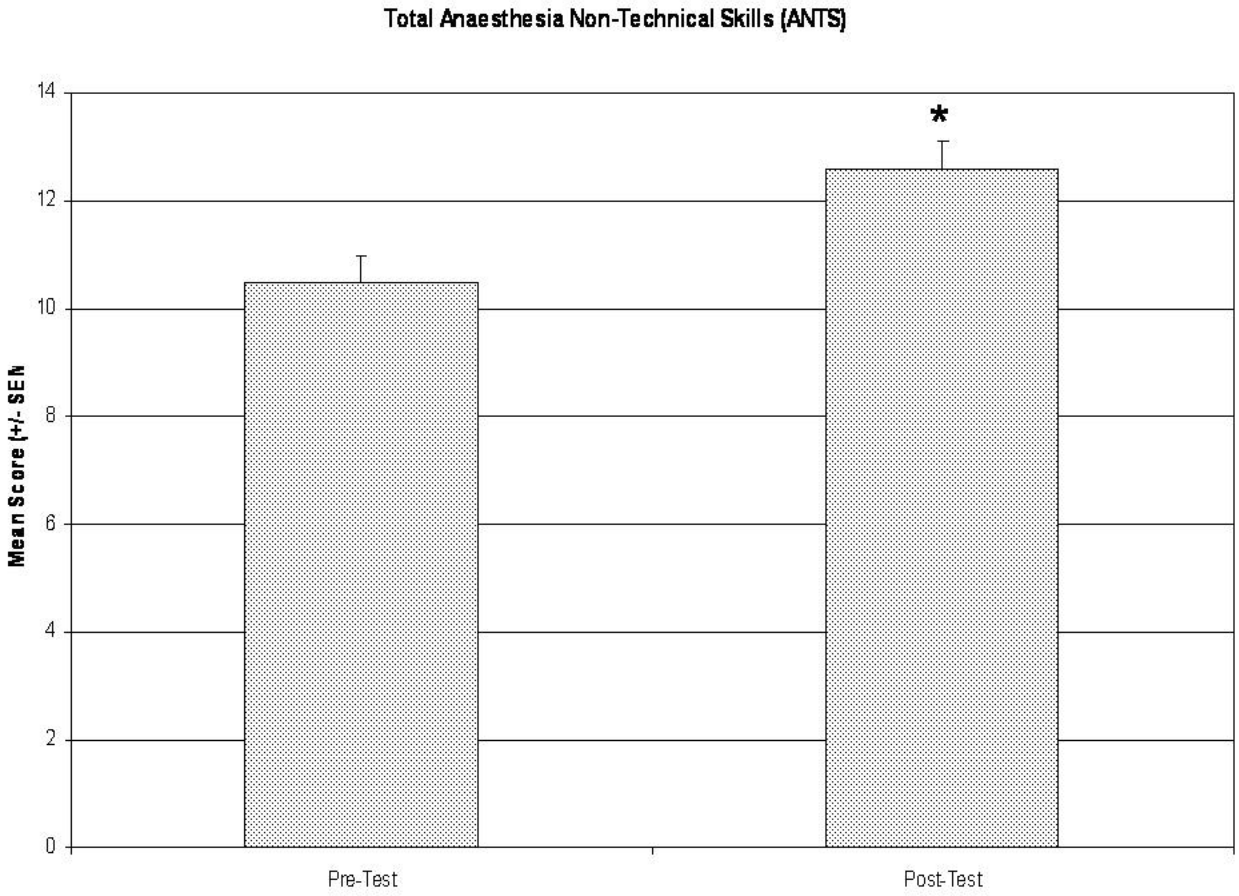
Methods: After institutional ethics approval, 8 junior anesthesia residents were recruited as subjects. Each had one individual debriefing of their management of a crisis prior to a pre-test. The pre-test was the management of a simulated intraoperative cardiopulmonary arrest, followed by a videotape-assisted debriefing focused on their non-technical skills. No subjects participated in a simulator session for eight months. Eight months after their pre-test, each subject returned to manage a post-test, consisting of the management of a similar intraoperative cardiopulmonary arrest. Videotaped performances were reviewed by two expert blinded independent assessors who rated each subject's non-technical skills, using a previously validated and reliable marking system.(1)

Results: A significant improvement in non-technical skills was observed eight months after a simulated crisis resource management training session ($p<0.001$)(see Figure).

Conclusions: Not only are measurements of residents' non-technical skills sustained with respect to simulated crisis management eight months following a training session - they are improved. Residents' reflection on their simulated crisis experience and debriefing may have lead to improvement. Improvement may also be secondary to non-technical skills that were practiced clinically, after simulator sessions. Educators should be reassured that the non-technical skills learned during simulated crisis management training sessions are durable.

References: (1) Fletcher G et al, *Br J Anaesth* 2003; 90(5): 580-8. (2) Yee et al, Anesth 2005; 103(2): 241-8.

COI statement: None


Total Anaesthesia Non-Technical Skills (ANTS)
Mean Score (+/- SEM
14
12
10
8
6
4
2
0
*
Pre-Test
Post-Test

Research Abstract : 15

Cognitive Aids Do Not Prompt Initiation of Cardiopulmonary Resuscitation in Simulated Pediatric Cardiopulmonary Arrest.

Kristen Nelson[1,2], Nicole Shilkofski[1,2], Jamie Haggerty[2], Kimberly Vera[3], Mary Saliski[1,2], Elizabeth Hunt[1,2]
[1]Johns Hopkins School of Medicine, Department of Anesthesiology and Critical Care Medicine, Baltimore, Maryland, [2]Johns Hopkins Simulation Center, Baltimore, Maryland, [3]Johns Hopkins School of Medicine, Department of Pediatrics, Baltimore, Maryland

BACKGROUND: While American Heart Association (AHA) guidelines exist for proper management of cardiopulmonary arrest (CPA), in-hospital cardiopulmonary resuscitation (CPR) is often of poor quality and is not performed in all indicated situations. Pediatric CPA is additionally challenging due to complexity associated with weight-based medication dosing and low volume of health care provider experience. Code cards have been created to assist in rapid, accurate recall of the guidelines for pediatric CPA management and serve as an example of a cognitive aid, a device to supplement clinical decision-making. Such aids are now routinely used in other industries in high stress situations which are more prone to error. However, no published study to date has evaluated whether cognitive aid use prompts CPR initiation during pediatric CPA.

OBJECTIVES: Primary outcome: 1) Calculate proportion of pediatric residents a) who are not performing CPR on the simulated 'pulseless' patient when cognitive aid use is initiated and b) who then initiate CPR after cognitive aid use. Secondary outcomes: 1) Calculate a) proportion of residents who use a cognitive aid during simulated CPA and b) mean time to initial cognitive aid use. 2) Document action immediately following cognitive aid use.

METHODS: Observational, descriptive study. Residents participated in individual mock codes over 2 years during competency assessments. Utilizing a high fidelity simulator, each resident participated in a standardized scenario that involved pulseless ventricular tachycardia and pulseless electrical activity. Residents were permitted to utilize items normally available in code situations, such as stethoscopes and cognitive aids. Cognitive aid use was documented if a resident referred to it to make a medical decision. Data was objectively assessed using videotapes and time-stamped computer logs.

RESULTS: 132/158 (83.5%) of pediatric residents participated. 125/132 (95%) of videotapes were available for review. 107/125 (85.6%) of residents used a cognitive aid. Mean time to cognitive aid use was 106 seconds (+/-100) after the patient became pulseless. Most common immediate actions prompted by cognitive aid use were: defibrillation 43/107 (40%) and epinephrine administration 27/107 (25%). Of those residents who used the AHA Pediatric Advanced Life Support (PALS) aid, 11/41 (27%) inappropriately chose 'tachycardia with poor perfusion' algorithm instead of 'pulseless' algorithm. Using this algorithm resulted in cardioversion and adenosine administration, delaying appropriate actions of defibrillation and epinephrine administration. Most alarming, 58/107 (54%) were not performing CPR on the pulseless patient when cognitive aid use was initiated. Furthermore, despite actively using a cognitive aid, only 2/58 (3.4%) were prompted to initiate chest compressions.

CONCLUSION: Initiation of timely CPR is a vital link in the chain of survival. This study demonstrates that current cognitive aids do not prompt initiation of these critical basic life support skills, likely contributing to delays and errors in cardiopulmonary arrest management. Pediatric residents appear to use cognitive aids early and often in cardiopulmonary arrests in an effort to effectively manage highly stressful events with high morbidity and mortality. Failure to prompt CPR initiation by these aids represents a 'missed opportunity' to enhance performance of these vital skills. Future studies will objectively evaluate impact of cognitive aid design on CPR performance.

COI statement: None

Research Abstract : 14

An evaluation of hybrid simulations to support medical students learning clinical procedures - a focus on patient safety and communication.

Debra Nestel, Maria Woloshynowych, Tanya Tierney, Roger Kneebone, Ara Darzi
Department of Biosurgery & Surgical Technology, Imperial College London

Background

Internal review highlighted teaching patient safety and communication skills associated with clinical procedures. Both topics feature in the General Medical Council's document on graduate outcomes. Challenges included developing an educational intervention within a limited budget, large student cohorts (~380) and an already full curriculum.

We aimed to provide opportunities for students to:

· Reflect on progress towards meeting the GMC's expectations

· Observe and discuss ways to manage challenging patient safety and communication scenarios

Research question

To what extent does the session raise students' awareness of their responsibilities in patient safety and communication and provide practical strategies to manage relevant clinical scenarios?

Methods

The 3-hour session consisted of readings, reviews, observations and discussions, grounded in students' experiences of clinical procedures. All activities focused on patient safety and communication. Using three hybrid simulations (where an actor is 'seamlessly connected' to simulation kit), students rated the degree to which they met learning objectives and the usefulness of educational methods.

Results

Eight sessions with group sizes of 25 to 47 students, 4 tutors and 3 actors were run. The response rate was 64%. Table 1 shows mean ratings of the degree to which students met learning objectives. The simulation activities had the highest mean rating of educational methods (5.2, SD 1.1). Recommendations from students included better alignment of the session with timing of clinical attachments, making explicit links with other curriculum activities, highlighting professionalism, providing scenarios that deal with managing patients whose language is different to their own, who are experiencing strong emotions and scenarios that demonstrate interactions with clinicians from other cultures.

Conclusions

The session was highly valued and raised awareness of students' responsibilities for patient safety and communication. Hybrid simulations were engaging because of their drama, relevance and trigger for discussion.

Table 1: Students' ratings of the degree to which they met learning objectives (n=196) (6-point scale from 1=not at all to 6=completely met)

	mean	SD	range
Define the concept of patient safety	4.9	0.9	4
Outline the GMC specified patient safety and communication learning outcomes in Tomorrow's Doctors	4.5	1.1	4
Describe the patient's role in safety	4.7	1.0	4
Recognise your responsibilities in relation to patient safety	5.1	0.9	4
Describe a systematic approach to performing procedures so as to minimise harm	4.6	1.1	4

Describe how to take responsibility for managing the tension between learning a procedure on a patient and minimising that patient's discomfort and risk	4.6	1.0	4
Describe key principles for effective information exchange with patients	4.9	1.0	4
Describe key principles for effective information exchange with colleagues	4.6	1.0	4
Know key principles for giving feedback on practice that needs improvement	4.6	1.0	4
Reflect on your strengths in communicating information to patients about procedures	4.6	1.0	4
Recognise areas for development in your communication skills	4.7	1.0	4
Describe how you will develop these communication skills	4.3	1.1	5

COI statement: None

Research Abstract : 10

Comparison of Traditional versus High Fidelity Infant Simulation for Certification in Pediatric Advanced Life Support (PALS).

Amy Nichols[1], Lynda Knight[2], Lorry Frankel[1,2], Alan Schroeder[1,2], Kyle Harrison[1,2]
[1]Lucile Packard Children's Hospital, [2]Stanford University Medical Center

Background: Studies indicate that simulation- based training programs are more pertinent to and better accepted by adult learners than traditional programs (1,2,5,7,11,13). The integration of the Sim Baby to the PALS program is based on the infinitesimal quantity of studies done with simulation-based training in the Pediatric clinical environment.

Purpose: This study investigated the use of traditional PALS certification versus Simulation-based PALS certification with 100 healthcare workers who have not taken the PALS course before, or have allowed their certification to expire. The study integrated the simulation-based teaching into the current AHA PALS program.

Method: Each group of 12 participants was subdivided into groups of 6. On the first day, six participants were randomly chosen into the integrated program using the Laerdal Sim Baby in the practice stations. In the control group, the other 6 participants will practice with traditional PALS manikins and teaching with similar PALS protocols and guidelines through the traditional teaching method. On the second day, all participants returned as one group to PALS training and were tested using the standard AHA written exam and the practical exam evaluated and scored by blinded PALS certified instructors using the PALS Score Reporting Evaluation Tool. Prior to the start of the study, blinded participants used the scoring sheets three times and were compared with the scoring of the study coordinator for inter-rater reliability. The blinded observers used this scoring sheet which evaluated technical skills, communication skills, team dynamics, adherence to PALS protocols, and overall clinical competency.

Results: Study results indicated an increased the response time of critical decision making during life-support resuscitation, improved communication skills and increased efficiency of decision making during resuscitation, increased ability of team dynamics by efforts to troubleshoot and problem solve as a team, decreased errors during resuscitation efforts.

Conclusion: The use of high fidelity infant simulation incorporated within PALS certification created a highly realistic patient simulation for the practice of PALS skills, teamwork, and leadership and communication skills in a controlled safe environment**.**

COI statement: The authors disclose that they have grant funding support from Laerdal Medical Coorporation.

Research Abstract : 58

Development of a Simulation and Internet Based Pilot Intervention to Evaluate Adherence to a Patient Transfer Protocol in the Real World Environment .

John O'Donnell[1,2,4,5], Judith Bradle[3,4], Joseph Goode Jr.[1,2,4]
[1]University of Pittsburgh School of Nursing, [2]Winter Institute for Simulation, Education and Research (WISER), [3]Beckwith Institute of UPMC, [4]University of Pittsburgh Medical Center, [5]University of Pittsburgh Graduate School of Public Health

Introduction

Back and musculoskeletal injury among direct care personnel is epidemic with 80% of nurses expected to experience at least 1 significant injury during their career. 'Mono' interventions have been largely unsuccessful in reducing injury rates. A purpose of this IRB approved pilot study was to evaluate adherance to a 10 point transfer protocol supported by internet material and transfer simulation training. Aims included: 1) demonstrate adherence to a 10 point protocol 2) improve patient transfer skills, 3) improve knowledge base, 4) evaluate subject attitudes toward the educational intervention, 5) evaluate level of subject satisfaction, 6) demonstrate reliability of measurement.

Methods

A standardized 10 step transfer protocol was developed through hierarchical task analysis. The intervention consisted of internet supported didactic material combined with practice of simulated transfer scenarios followed by evidence-based debriefing.

Seventy-one subjects were enrolled from three rehabilitation units and each received a 4 hour intervention. An additional rehabilitation unit was used as a control. Patient transfer simulators were used for the hands-on training. Pre-intervention measures included knowledge, attitude, demographic, and psychomotor skills with post-intervention measures including knowledge, attitude, and psychomotor skills as well as satisfaction. Coders were trained by ergonomic experts on '10 'live' transfer events. Interrater reliability was established by comparing coder and expert values for the simulated transfers. 'Live' transfer events were gathered prior to training, at 4 weeks and at 12 weeks.

Results

Aim 1: Transfer skills improved according to the 10 point protocol in the simulated teams: n= 19 teams, $t_{18,.05} = -14.76$, $p \leq 0.0004$. Transfer skills improved according to the 10 point protocol in the real world patient care environment: n=304 total transfer events, baseline vs.4 week transfer success ANOVA $p \leq 0.0001$, and intervention vs. control group ANOVA $p \leq 0.0001$. Protocol adherance on the intervention units regressed toward baseline at 12 weeks, staff turnover on these units was proportionate to the decrease in adherence.

Aim 2: Knowledge improvement was substantial (n= 67 pairs, $t_{66,.05} = -11.21$, $p \leq 0.0004$).

Aim 3: Attitudes changed across multiple subscale items with significance demonstrated on 13/15 questions.

Aim 4: Subjects demonstrated a high degree of satisfaction with the intervention and qualitative responses indicated a desire for additional exposure.

Aim 5: Inter-rater reliability was assessed for each of the 10 point protocol steps. Cohen's *kappa* values ranged from 0.43- 0.83 (mean= 0.62) indicating substantial agreement between ergonomic experts and trained coders.

Conclusions

Post-intervention adherence to a 10 point transfer protocol was similar in subjects between the simulated and real world environment. Significant change in knowledge, attitude, and skill was also demonstrated. Subjects were highly satisfied with the intervention. Reliability of the tools used within the study was demonstrated.

Funding: Project sponsored by funding from the USAF, administered by the US Army Medical Research Acquisition Activity, Ft. Detrick, MD (Award # DAMD 17-03-2-0017)

COI statement: None

Research Abstract : 8

Pediatric Simulation Based Didactics for the Delivery of Difficult News.

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Background High fidelity medical simulation is an evolving tool, currently used by many institutions to teach procedural skills, teamwork skills and medical decision making skills. There are situations where skillful communication is essential when caring for patients and their families. Two examples are dealing with the death of a child and discussing a medical error with a family. A resident may never receive training or the opportunity to practice how to communicate in these types of situations, and their first experience might be in an actual case.

Methods We created and pilot tested two scenarios to assist in teaching communication strategies for delivering difficult news. The first scenario was a 6 m/o female with sudden infant death syndrome(SIDS). The teaching goals of this case were 1)practicing pediatric asystole algorithm, 2)deciding when to end a resuscitation and 3)communicating the information of the death of a child to the family. The second scenario was a 16 y/o male in the ED for gastroenteritis who is unintentionally paralyzed with rocuronium. The teaching goals of this case were 1)managing the airway, 2)considering etiologies of apnea/paralysis and 3)communicating the information of an unintentional medication administration to the family.

We had concerns that running a scenario with a dead infant and a staged medical error might not be well received by the participants. The ability to suspend disbelief and replicating the emotions of these types of cases were new challenges for our simulation staff.

The 6 m/o SIDS case was run for the PGY-2 and PGY-3 pediatric residents, and the PEM fellows. The PEM fellows also managed the medication error scenario.

Results Participant feedback from project sessions is summarized below. (N=44)

Survey question	Relevance to your training/duties	Realism of simulation scenario	Realism of simulation environment	Quality of simulation debriefing	Overall simulation training experience
ScoreAverage (SD)	4.9 (0.4)	4.5 (0.7)	4.5 (0.5)	4.8 (0.4)	4.9 (0.4)

(Poor=1, Fair=2, Average=3, Good=4, Excellent=5)

Several comments from participants are listed below:

“The SIDS case is very worthwhile. Traumatizing but worthwhile”

“Great experience- very valuable to try out these situations first at sim center rather than on the floors.”

“Very real, excellent learning experience”

Conclusions Our exploratory questions and concerns about running scenarios with infant death and staged medical error were answered with the feedback from the participants. All trainees felt the simulation-enhanced didactics for delivery of difficult news were both realistic and useful for their training needs.

COI statement: None

Research Abstract : 1

Baseline virtual reality endoscopic performance among novices.

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BACKGROUND

The use of endoscopic simulation in the training and assessment of medical and surgical residents is a rapidly expanding field of study. To date, there have been no published benchmark studies on baseline endoscopic performance in true novices.

METHODS

Non-medical, novice participants were enrolled in a prospective evaluation of colonoscopy ability on the virtual reality endoscopic simulator GI Mentor II™. Participants were asked to complete an anonymous demographic sheet that included: occupation, prior endoscopy exposure, age, gender, height, and prior video game experience including estimated amount of hours per week and types of games played.

Participants were then given a brief, standardized orientation on the purpose of colonoscopy and the basic use of a colonoscope. Each participant was then given five minutes to negotiate the colonoscope from the anus to the cecum on GI Mentor II™ colonoscopy module 1, level 1. Endoscopic metrics including: % mucosal surface examined, % of time with a clear view, number of times lost view of the lumen, number of times with excessive pressure, % of time patient spent in pain, number of times with loop formation, and amount of loop time were all prospectively collected for each participant and correlated with their respective demographic data.

RESULTS

Forty-two participants (30 male, 12 female) from a wide variety of non-medical occupations were enrolled in this study with a mean age of 30 ± 10 years. Fifteen participants (36%) reached the cecum within the designated time limit. These participants had significantly higher percentages of mucosal surface examined ($p<0.001$) and time with a clear view ($p<0.006$) compared to participants who did not reach the cecum. Participants with prior video game experience ($n=20$) did not reach the cecum more frequently ($p>0.10$) or with higher metric scores ($p>0.10$) than participants without video game experience. Participant age, gender, height were not significantly associated with ability to reach the cecum.

CONCLUSION

For novices, the metrics of percentage of mucosal surface examined and time with a clear view may be the most reliable in establishing baseline endoscopic performance when using the GI Mentor II™. This result sets a benchmark by which future studies can demonstrate learning with instruction on this virtual reality simulator. Prior video game experience, as well as a learner's age, gender, or height is not significantly associated with endoscopic facility in true medical novices. The reason why some participants have a higher baseline ability to perform a simulated colonoscopy requires further evaluation.

COI statement: None

Research Abstract : 17

Environments for Conducting Simulation Programs.

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Introduction: Simulation based training, education and assessment is becoming commonplace in the healthcare. Large, dedicated simulation centers are emerging at a rapid rate and numerous previous studies indicate high rates of satisfaction of their users.

Geographical considerations, as well as operational decisions can create barriers to the conducting of training in dedicated large centers. We compare various parameters of trainee's perceptions of simulation based programs that were conducted in nontraditional, off-site locations to that of a large university based simulation center.

Method: During 2004 and 2005 and a simulation based course was conducted for flight crew members of a large air medical transportation system which operates 16 helicopters with a field crew of over 200 healthcare professionals. The course was a simulation based education and assessment program to provide annual skill updates as well as competency assessment evaluations.

After each training encounter trainees completed a standard on-line WISER evaluation form. We evaluate various components of the survey and compare the perceptions of those crew members who participated at the WISER center to those who participated in off-site locations such as helicopter bases, fire departments and hotels. The course at the off-site facilities included the same instructors, level of simulation hardware, computer support and audio visual equipment that is utilized at WISER.

Results: Likert scale evaluation data from 361 respondents were reviewed as well as free text entries. 281(78%) crew members participated on-site at the WISER Institute location and 80(22%) had participated at off-site locations. We calculate a median and interquartile ratios (IQR) for on site versus off site. We then evaluate any significance difference by determining a p-value by using the Wilcox rank-sum test.

Overall course rating (OffSite (Med 8; IQR:(7 – 9)), OnSite (Med 8.5; IQR:(8 – 9)) p= 0.0001); Appropriate for my level of learning ((Off Site Med 8; IQR:(7 – 9)), OnSite (Med 9; IQR:(8 – 9)) p= 0.0067); Scenarios were realistic ((Off Site Med 8; IQR:(6 – 9)), OnSite (Med 8; IQR:(7 – 9)) p= 0.7439); Scenarios were challenging ((Off Site Med 8; IQR:(7 – 9)), OnSite (Med 8; IQR:(7 – 9)) p= 0.9168); Scenarios were appropriate for level of education ((Off Site Med 8; IQR:(7 – 9)), OnSite (Med 8; IQR:(7 – 9)) p= 0.1181); Simulation training has improved my confidence ((Off Site Med 8; IQR:(6 – 8)), OnSite (Med 8; IQR:(6 – 8)) p= x); Debriefing was helpful ((Off Site Med 9; IQR:(7 – 9)), OnSite (Med 9; IQR:(8 – 9)) p= 0.5708); Debriefing was completed in a professional, non threatening manner ((Off Site Med 9; IQR:(8 – 9)), OnSite (Med 9; IQR:(8 – 9)) p= 0.6272); Overall facility rating ((Off Site Med 7; IQR:(6 – 9)), OnSite (Med 9; IQR:(8 – 9)) p= 0.00); I am uncomfortable with simulation based competency because it is unrealistic ((Off Site Med 1; IQR:(1 – 2)), OnSite (Med 1; IQR:(1 – 2)) p= 0.3714)

Conclusions: The ability to conduct successful simulation center based programs in off-site locations is possible without significantly affecting trainee's perceptions, expectations or opinions about simulation training programs.

COI statement: None

Residency Education: Impact of Clinical Simulation Training on Anxiety and Self-Confidence.

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Objectives: ACGME outcome project dictates that by July, 2006 GME programs should implement full integration of the competencies and their assessment with learning and clinical care. Competent performance requires not only requisite knowledge and skills but also beliefs of personal efficacy, to use both effectively. Performance is the result of having the right skills and knowledge, however performance may also be affected by anxiety, and perception of self-confidence. The main objective of this study was to determine the levels of anxiety and self-confidence experienced by first year residents immediately pre and post simulation training.

Methods: First year residents from specialties including Anesthesiology, Diagnostic Radiology, Emergency Medicine, Family Medicine, Surgery, Internal Medicine, Ob/Gyn, Pediatrics, Psychiatry, and Urology participated in a one-day clinical simulation exercise. This exercise was designed to assess residents' ability to perform specific tasks included performing IV, phlebotomy, nasal gastric tube, foley-male/female, arterial blood gases, LP adult/infant, and chest decompression and suturing. In addition, residents participated in ACLS code simulated scenarios. State and trait anxieties were measured pre training using the State-Trait Anxiety Inventory. In addition, we used a 100 mm Visual Analogue Scale anchored with "not anxious at all" at one end and "extremely anxious" at the other end to assess pre and post training anxiety associated with the specific tasks included in the training. We assessed the resident's level of confidence pre and post training using a questionnaire that was based on a 5-point likert scale where 1= "not at all," and 5="extremely confident." Data were analyzed using the paired *t* test and the signed rank test, as appropriate. A p value of < 0.05 was considered to be statistically significant

Results:

Sixty-six residents completed the pre and post rating of anxiety and self-confidence. The residents' mean age was 29±4 (range, 21 to 43) years, and 45 (68%) were males. The mean pre-session trait anxiety was 35.9±9 less than the reported for college students (38.3±9), and the mean pre-session state anxiety was 43.9 ± 13. Residents reported lower anxiety scores after training associated with all specific skills including performing IV ($p<0.0001$), phlebotomy ($p<0.0001$), nasal gastric tube ($p<0.0001$), foley-male ($p<0.0007$), foley-female ($p<0.0002$), arterial blood gases ($p<0.0001$), LP-adult ($p<0.0001$), LP-Infant ($p<0.0001$), chest decompression ($p <0.0001$), suturing ($p<0.000$), and running a code ($p<0.0001$). The most anxiety provoking aspects of the first year residency and main source for lack of confidence included running a code, and being on duty call. At the conclusion of their training, residents reported significantly higher levels of confidence in performing skills included in the training except suturing. The most valuable experience during the one-day training that influenced residents' self confidence was active participation during a code scenario.

Conclusions: Clinical simulation training is effective in decreasing anxiety and increasing self-confidence in first year residents. GME programs should consider incorporating a code training exercise early during orientation week for first year residents. Further research is warranted to determine the long-term effects of clinical simulation training on anxiety and self-confidence experienced by first year residents.

COI statement: None

Research Abstract : 66

Teaching Residents to Question and Challenge Their Teachers: A Simulator Experience.

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Background: Trainees need to "speak up" at the bedside, often without hesitation, about potentially questionable patient care practices initiated by their instructors and team-members. We sought to determine if trainees could learn to speak up in these situations using a simulation model.

Methods: With informed consent, anesthesiology trainees participated in a simulated OR obstetrical scenario that presented opportunities to challenge (e.g., administration of a relatively contraindicated drug, performance of a potentially unsafe procedure). In each scenario, one challenge opportunity was designed to involve the anesthesia attending, surgeon, and circulating nurse (all confederates). In a post-scenario debriefing one of the investigators taught a conversational technique that combined "advocacy" (stating the resident's observation, opinion or position) with "inquiry" (an open, curious request for the other person's reasoning) as a method to initiate a challenge.[1] Also, a "two-challenge" technique was promoted. A post-debriefing scenario was used to test the learning of the technique. Two investigators conducted post-hoc video review and 5-point rating of the quality of response for each challenge. Pre- and post-debriefing scores were pooled and the frequency of each score presented.

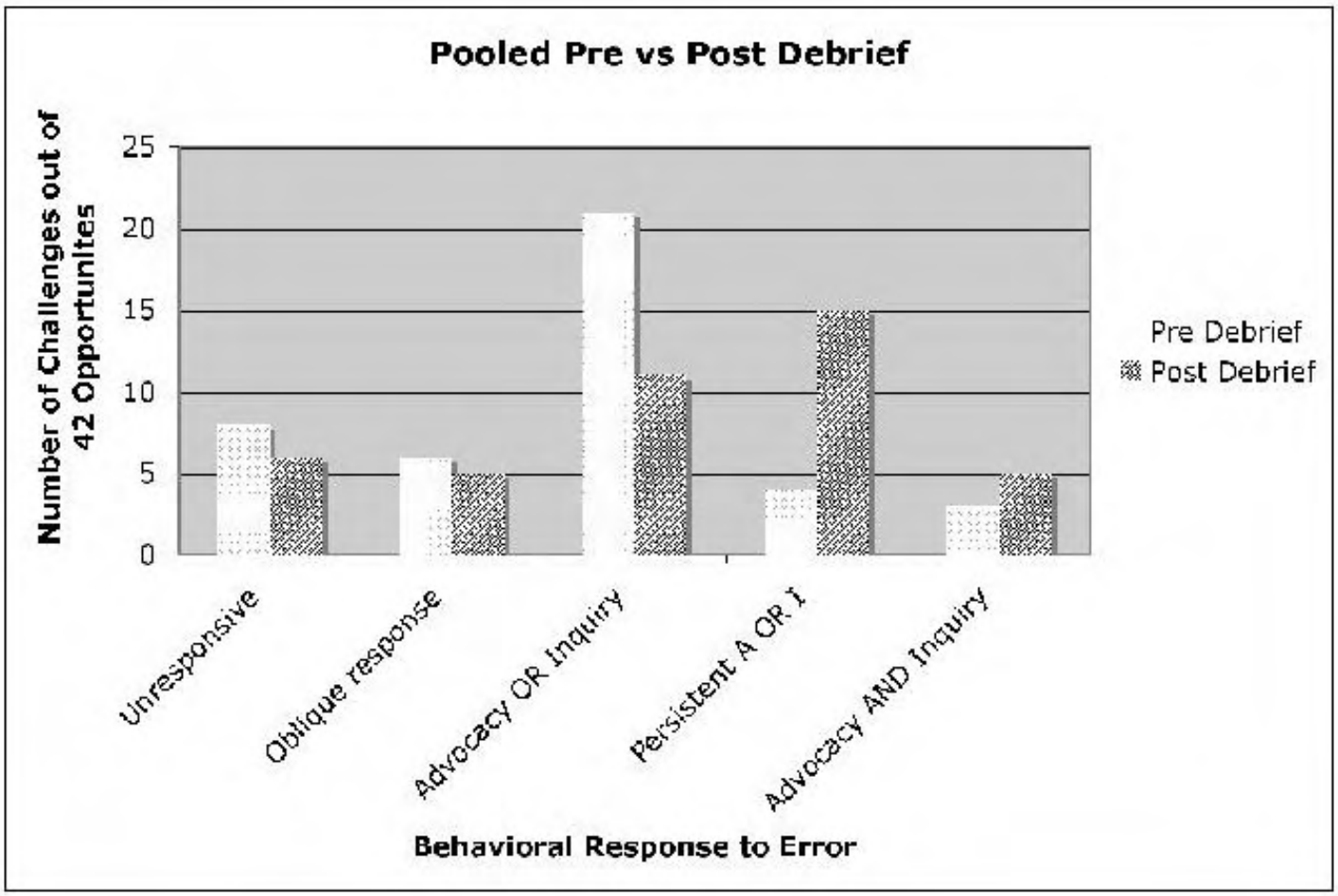
Results: Preliminary data from 14 (of a projected 40) residents suggest that, prior to debriefing, residents were reluctant and ineffective in challenging their teachers. After instruction in the "two-challenge" and "advocacy-inquiry" approaches, they were more effective in these exchanges.

Conclusion: Effective, professional language for difficult conversations is particularly important in the medical field where teamwork has immediate effect on patient safety. Our results suggest that a curriculum utilizing simulation and debriefing can result in improved communication skills.

Reference:

1. Rudolph J, Simon R, Dufresne RL, Raemer D: There's No Such Thing as "Non-Judgmental" Debriefing: A Theory and Method for Debriefing with Good Judgment. Simul Healthcare 2006; 1: 49-55

COI statement: None


Pooled Pre vs Post Debrief
Number of Challenges out of 42 Opportunites
25
20
15
10
5
0
Unresponsive
Oblique response
Advocacy OR Inquiry
Persistent A OR I
Advocacy AND Inquiry
Behavioral Response to Error
Pre Debrief
Post Debrief

Research Abstract : 65

Manikin-Based Simulations and High-Stakes, Summative Testing: Exploration of Methods to Define Scoring Criteria.

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Introduction - High-fidelity, mechanical and virtual reality simulators are valuable tools for learners to acquire proficiency without risk to human subjects. While current studies using this technology tend to focus on learning and skill acquisition, a research agenda is needed to develop methods and models that focus on assessment. The purpose of this paper is to summarize initial findings of an exploratory study that sought to define scoring criteria for high-stakes, summative examination of senior medical students using manikin-based simulations.

Methods - The female pelvic examination was selected as the task for this study, and the Pelvic ExamSIM® was used as the simulator. The Pelvic ExamSIM® is a manikin-based simulator instrumented internally with sensors that allow for quantitative assessment of the examiner's palpations during an examination. A convenience sample of volunteers was recruited to reflect a range of training (medical students, n=6; residents, n=11) and expertise (nurse practitioners, n=4). The examiners completed background surveys, performed bimanual examinations on four different Pelvic ExamSIM® inserts, and completed post-examination surveys. Five expert task force members reviewed data from the examiners during the course of a two-day meeting. During this review, they judged content and task domain and developed criteria for performance of a clinical female pelvic examination.

Results - Computer-generated simulator data revealed that less experienced examiners (students and 1st year interns) spent more time on the examination and applied less palpation pressure than more experienced examiners. Mean examination times were 44.5 seconds and 31.3 seconds respectively, $p < .05$. Mean palpation pressures were 1.58 psi and 2.85 psi respectively, $p < .005$. In addition, experienced examiners were more likely to generate the correct diagnosis. Audio recordings during the examinations revealed that less experienced examiners lacked a structured framework for approaching the patient and beginning the examination. Examiners with more experience started the examination the same way and followed similar sequences in describing their actions based on anatomic landmarks. Post-examination surveys showed consistent agreement across all examiners that the scenarios presented were clear and appropriate.

Task force members uniformly agreed on the importance of considering aspects of the encounter beyond specific physical examination maneuvers including: communication and proper acquisition and handling of cervical and other specimens. In addition, task force members generated a 28 item checklist for assessing clinical pelvic examination skills. There was uniform agreement that 15 of the 28 items were necessary to pass an examination based on proper clinical assessment of the female pelvic organs. Finally, task force members uniformly agreed how the computer generated simulator data could be used in addition to the checklist items to generate performance scores and pass/fail criteria.

Conclusion - The present study provides some preliminary results of an exploratory method used to generate assessment items and pass/fail criteria for the Pelvic ExamSIM ®. While our initial results are promising, further work needs to be done to assess the validity and reliability of this approach in defining scoring criteria and setting standards for the summative assessment of intimate and potentially invasive clinical examinations using manikin-based simulations.

COI statement: Pugh - Consulting and License agreement (with royalties) with METI (Medical Education Technologies, Inc.)

Research Abstract : 18

Development of a Validated Multiple Choice Exam*.

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Background: This report describes the development and validation of a multiple choice examination on difficult airway management. It will be used as a formative assessment tool to monitor resident learning, detect deficits and provide feedback to residents about their educational progress.

Method: We used an 8-step system to create the difficult airway exam. The steps are: (1) Identify target audience: clinical based anesthesia residents from 1st, 2nd and 3rd year (CA-1, CA-2, CA-3); (2) Develop specification table to identify topics in difficult airway management: knowledge of procedural skills, comprehension and application of airway techniques, American Society of Anesthesiologists' difficult airway algorithm, medications for airway anesthesia, airway blocks, monitoring of airway management, oxygen delivery devices[1,2]; (3) Identify question writers; (4) Create a "how-to manual" on writing type A exam questions (selection of one best answer out of four); (5) Develop and use a checklist to ensure the exam follows the rules in the guidebook; (6) Identify external review board specialized in airway management to edit exam content; (7) Pilot the exam at four external sites--strict guidelines were followed when residents taking the exam (similar conditions to written boards);(8) Statistical analysis to validate test and assess discrimination between the groups.

Three clinical anesthesiologists with international recognition in airway management took the exam and then checked their answers against the answer key and provided comments to improve the exam.

Results: The 112 question exam was piloted in March 2006 by 94 residents (n = 34 CA-1, 27 CA-2 and 33 CA-3) from University of Chicago, Children's Hospital in South Carolina, University of Texas Medical School, and New York Mount Sinai Medical Center.

The mean raw score at the four sites combined was 65 ± 10 for the group and 61± 6.6 for CA-1, 66 ± 7.5 for C2 and 68 ± 12.8 for CA-3 residents, p = .012 in analysis of variance. Multiple regression analysis controlling for residents' age, sex and academic center indicated that CA-2 residents had a 6 point higher (p=.02) and CA 3 residents a 6.5 point higher score (p=.008) than CA-1 residents. The Kuder-Richardson reliability coefficient was 0.8.[1]

Conclusions: On the difficult airway exam, residents' knowledge was demonstrated at 50% at four anesthesia departments (i.e. 65/112). The exam results indicate that the knowledge required in difficult airway management has yet to be achieved in our current method of clinical base teaching. Development of a validated test was achieved with good item performance following rigorous adherence to the 8 steps.

* funded by Foundation for Anesthesia and Education Research in January 2005, granted exempt status from Northwestern University Feinberg School of Medicine's Institutional Review Board.

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2."Using the Taxonomy of Educational Objectives." P 29-36. Gronlund NE. How to Write and Use Instructional Objectives. University of Illinois.

COI statement: None

Research Abstract : 59

Evaluation of a problem based (PB) simulation module on graduate nurse anesthesia student learning and attitudes toward human simulation education.

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Introduction: The purpose of this study was to determine if knowledge acquisition occurred with student participation in problem based simulation module and if their attitudes associated with simulation changed significantly with the experience.

Methods: After receiving IRB approval, 1st year nurse anesthesia students enrolled in Applied Physiology and Pathophysiology (2nd semester) were assigned to a PB simulation session. Twenty-nine (n = 29) students who volunteered as subjects completed a 22-item multiple choice pre and post-quiz and a 16-item pre and post-attitudinal survey consisting of a 5-point Likert rating scale (1-strongly disagree, 2-disagree, 3-neutral, 4-agree, 5-strongly agree). All quiz and survey responses were entered via laptop into the Winter Institute for Simulation, Education and Research database with only de-identified data available for investigator analysis.

Results: Paired sample t-tests were performed on the pre/post simulation quiz scores and on each of the pre/post attitudinal survey items. There was a statistically significant increase on the student scores between pre-quiz score (M = 54.08, SD = 12.469) and post quiz score (M = 73.98, SD = 10.009), $t_{28} = -10.746$, $p < .001$. There was a statistically significant increase in ratings between student anticipation that the PB anesthesia scenarios would be similar to actual clinical situations pre-module (M = 4.33, SD = .784) and post-module rating that the PB anesthesia scenarios were similar to actual clinical situations (M = 4.63, SD = .492); $t_{26} = -2.302$, $p = .03$. There was a statistically significant decrease in the anxiety rating associated with peers observing simulation performance between pre-module rating (M = 3.75, SD = 1.175) and post-module rating (M = 2.89, SD = 1.315), $t_{27} = 4.204$, $p < .001$; and decrease in the anxiety rating associated with faculty observing simulation performance between pre-module rating (M = 3.79, SD = 1.067) and post-module rating (M = 2.96, SD = 1.401) $t_{27} = 4.116$, $p < .001$. There was a statistically significant increase in student confidence that performance would be held confidential by peers between pre-module rating (M = 3.88, SD = 1.243) and post module ratting (M = 4.23, SD = 1.069), $t_{25} = -3.143$, $p = .004$; and increase in student confidence that performance would be held confidential by faculty between pre module rating (M = 4.50, SD = .793) and post module rating (M = 4.714, SD = .460); $t_{27} = -2.274$, $p = .031$. On the average the students agreed to strongly agreed that the scenarios would be realistic, (M=4.39, SD = .722) and following the modules on the average the students continued to agree to strongly agree that the scenarios were realistic, (M = 4.39, SD = .522).

Conclusions: Human simulation teaching was found to be an effective adjunct to reinforce lecture content provided during the term. Students significantly improved their post test scores and felt less anxious with simulation teaching by the end of the session. Students agreed that the scenarios were realistic and were similar to actual clinical situations. Use of simulation to reinforce lecture content will be continued.

COI statement: None

Research Abstract : 41

Assessment of simulation-based learning in fourth-year pharmacy students while on an experiential rotation.

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Background: Little evidence exists on the effectiveness of simulation based education within pharmacy education. The pharmacy curriculum at the University of Pittsburgh School of Pharmacy includes experiential learning rotations during the final year of training. The objective of this study is to assess impact of simulation based learning on clinical pharmacotherapy skills related to treatment of dysrhythmias of fourth-year pharmacy students on acute care clinical rotation.

Methods: Approval was obtained from the University of Pittsburgh Institutional Review Board to perform this single-center, prospective, case-control study of fourth-year University of Pittsburgh School of Pharmacy students on acute care experiential rotation. Student enrollment was voluntary and withdrawal from the study was permitted at any time. Participating students were assigned to usual experiential teaching (control group) or simulation based learning (intervention group). In order to determine and compare the level of clinical pharmacotherapy skills of pharmacy students, a face-validated survey and test were administered to the control and intervention groups at the beginning and end of their fourth-year experiential rotation. This test assessed students' ability to recognize, manage, and monitor patients with various dysrhythmias. Students were asked to complete a survey pre- and post-rotation to assess attitudes toward simulation based learning. Outcome measures included mean pre- and post-rotation test scores for each study group, individual student improvement in pre- and post-rotation test scores, and survey responses for intervention and control groups. The control and intervention group pre-and post-test scores were compared using an independent t-test. Within group pre- and post-rotation test scores were compared using a paired t-test.

Results: A total of 22 fourth-year pharmacy students were enrolled in the intervention group and 20 students were enrolled in the control group. The mean pre-rotation test score in the intervention group was 42%, while the control group achieved 43%, $p=0.790$. The mean post-rotation scores were 70% in the intervention group and 46% in the control group, $p<0.05$. Within group comparison of test scores in the intervention group indicated a statistically significant improvement ($p<0.05$), however, no statistically significant improvement was noted in control group test scores ($p=0.478$). Survey results show improvement in confidence, skills, and knowledge in the simulation based learning group, while controls showed minimal improvement. The intervention group survey responses about confidence in patient care ability improved from 77% to 91%, with more students reporting that they were confident during the post-rotation survey. Initially, 90% of the intervention group and 75% of the control group felt that simulation would improve pharmacotherapy skills and knowledge; this increased to 100% in the intervention group and 85% in the control group during the post-rotation survey.

Conclusions: Fourth-year student pharmacists on an acute care experiential rotation were able to apply pharmacotherapeutic concepts in a controlled patient simulation environment. Student post-rotation test scores improved after simulation based learning when compared to usual experiential training. Students undergoing simulation based learning expressed increased confidence toward working in a clinical setting. Simulation based learning shows great potential to increase pharmacotherapeutic knowledge and enhance clinical pharmacy performance in a safe practice environment.

COI statement: None

Research Abstract : 42

Simulation-based learning to teach blood pressure assessment to doctor of pharmacy students.

Amy Seybert[1], Christine Barton[2]
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Background: There is a lack of objective evidence supporting the use of simulation based learning education within the pharmacy curriculum by objective performance measures. The purpose of this prospective trial is to assess the use of simulation-based learning on students' ability to perform accurate blood pressure assessments, improvement on objective examinations of hypertension therapy, and assessment of student satisfaction with this unique teaching method.

Methods: The Pharmacotherapy of Cardiovascular Disease course at the University of Pittsburgh School of Pharmacy is taught during the second year of pharmacy school. Institutional Review Board approval was obtained through the University of Pittsburgh. Didactic lectures on performance of blood pressure assessment were combined with practice sessions with a computerized human patient simulator. Students were given an objective examination prior to and after the hypertension section of the course. Students were surveyed post-simulation to determine effectiveness of the learning experience.

Results: Overall, 97 students completed the patient simulation sessions and 95 of 97 (98%) completed the written examinations and surveys. Students showed significant improvement in blood pressure measurement with each practice session with the patient simulator (Table 1).

Table 1: Assessment of Students' Ability to Perform Accurate Blood Pressure Measurements

Assessment	First Session	Second Session(2 weeks after first session)	Final Session	P value
Average Score from Grading Rubric(Total Score Possible = 8)	4.2	5.8	7.8	0.029
Percent of Students Obtaining Accurate Blood Pressure*	21.5%	65.6%	97.6%	<0.05

***Accurate BP was defined as within 5 mm Hg of the programmed BP**

Conclusions: Simulation-based learning has been successful throughout healthcare education and can improve the level of competence of pharmacists. Pharmacy students show significant improvement in objective assessments of clinical skills performance and knowledge of the pharmacotherapy of hypertension. Further study is needed to document other benefits to students and faculty who participate in simulation-based learning in comparison with traditional approaches to education. This method of teaching leads to high levels of student satisfaction. By introducing "real-life" clinical scenarios and patients into the early pharmacy curriculum, pharmacy schools can produce pharmacists whom will provide improvements in overall patient care.

COI statement: None

Research Abstract : 50

How does varying the scenario strategy change the case selection utilized in high fidelity simulation training for emergency medicine residents?

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Background: Limited scientific evidence is available concerning the most optimal method of selecting case scenarios for emergency medicine resident training. We sought to evaluate case selection variability based on the simulation strategy applied.

Methods: The study setting was an urban three-year emergency medicine residency program in Orlando, Florida. The residency program consists of 36 residents and 12 core faculty, including the program director and emergency department chairman. Three different simulation strategies were considered, each with 6 categories: (I) High Severity/low frequency strategy, (II) High frequency/low severity strategy, and (III) ACGME core competency-based strategy. Core faculty members were asked individually to propose two clinical cases, for each category, of the simulation strategies under evaluation. Members of the faculty were blinded to all other responses. Faculty responses were entered into tables I through III and the case selection choices were evaluated.

Results: Submissions were obtained from 9 core faculty members (i.e. with 36 selection choices per faculty member). Of the 324 selection choices, 276 (85%) entries were completed. The 48 choices that were left blank were from table III because four faculty members felt the core competencies are covered in the other two strategies. The 2 most common corresponding case selections are depicted in tables I through III.

Table I. High Severity/low frequency strategy

Trauma	**Medical-CV[1]**	**Respiratory[2]**	**Pediatrics**	**OB/GYN**	**Toxicological**
Cardiac Tamponade	Thoracic aortic dissection	Saddle Pulmonary Embolus	Cardiopulmoary Arrest	Placental Abruption	Tricyclic Antidepressant Overdose
Tension ptx	Valve Rupture	Asthmatic resp failure	Tetrology of Fallot	Postpartum eclampsia	Cyanide Toxicity

1=cardiovascular emergencies 2=respiratory emergencies

Table II. High frequency/low severity strategy

Trauma	**Medical-CV[1]**	**Medical-Resp[2]**	**Pediatrics**	**OB/GYN**	**Toxicological**
Extremity Sprain	Chest Pain	Acute asthma	Fever	Vaginal bleeding	Ethanol Toxicity
Closed Head Injury	Palpitations	Pneumonia	Vomiting/diarrhea	Pelvic pain	Acetamenophen Overdose

1=cardiovascular emergencies 2=respiratory emergencies

Table III. ACGME core competency-based strategy

PC[§]	**MK[§]**	**PR[§]**	**ICS[§]**	**PBL & I[§]**	**SBP[§]**
STEMI	Altered Merntal Status	Patients from jail	Sexual Assault	Mild TBI	Trauma Alert
Acute CVA	Sepsis	Patient Refusals	Advanced Directives	Trauma FAST	Stroke Alert

§ (PC=patient care; MK=medical knowledge; PR=professionalism; ICS=interpersonal & communication skills; PBL&I=practice based learning & improvement; SBP=systems based practice)

Conclusion: Considerable case selection variability exists based on the simulation strategy chosen. A high severity-low frequency strategy yields more clinical diagnosis selections, whereas, a high frequency-low severity strategy yields more complaint selections. Future studies should focus on the correlation between outcome measures and the simulation strategy.

COI statement: None

Research Abstract : 48

Simulation based teaching improves acute care knowledge and skills in both a graduate and undergraduate medical student population.

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Background: Evidence from a number of UK teaching hospitals suggests that students are graduating from medical school without the necessary practical knowledge and skills to function independently and safely, particularly in the acute setting. During clinical attachments at the University of Nottingham undergraduate medical students who have previously experienced mainly didactic teaching are joined by graduate entry medical (GEM) students who have studied a problem based learning course. This abstract describes our experience of introducing an additional simulation-based acute care training programme earlier in the undergraduate curriculum as part of the student's first clinical attachment. Furthermore we are able to compare GEM and undergraduate student exam performance.

Method: The course consists of five half-day sessions over a 10-week period. The first session introduces the basic topics to be covered throughout the course and the students receive detailed written material. Sessions 2-4 use a simulation-based approach encouraging students to work through nine short clinical scenarios. A process of self-evaluation allows the students to feedback their individual strengths and weaknesses. This data is reviewed and used to design the final session. Assessment for the course includes a pre and post course written exam and an end of course objective structured clinical exam (OSCE). Statistical analysis was performed using an unpaired student's t-test.

Results:

Table 1: Examination scores

	Mean Pre-course exam score	**Mean End of course exam score**	**% Students passing OSCE**
Overall	47.80% **(n=57)**	57.50% **(n=59)**	65% **(n=69)**
Graduate entry medical students	48.10%	58.50%	57.10%
Undergraduate medical students	47.40%	56.50%	67.30%

A significant difference ($p<0.05$) is seen between the overall pre-test and post-test written examination scores. There is no significant difference ($p>0.05$) between GEM and undergraduate scores in the written examinations.

Conclusions: This new programme improved medical students knowledge and skills in providing immediate assessment and management of acutely ill patients at an early stage in their clinical training. However the simulation based OSCE detected unacceptable performance of key skills in some students who had passed their modified EMQ assessment. Despite a problem-based education GEM students did not significantly out perform the undergraduate students in the end of course assessments.

COI statement: None

Research Abstract : 54

Anesthesiology Residents' Current Simulation Experience 2006.

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Introduction: Although anesthesiologists initiated simulation-based education theory and development on many fronts, the simulation teaching experience for anesthesiology residents remains quite varied. A variety of factors, including resident and faculty time, availability of simulation equipment, space, and support personnel, and faculty expertise with simulation-based anesthesia teaching may impact the accessibility and quality of simulation-based training for anesthesiology residents.

Methods: As a snapshot of the current experience of anesthesiology residents across the country, a survey was sent by the ASA via e-mail to CA-3 anesthesiology residents and fellows asking five questions about their simulation experiences during their residency

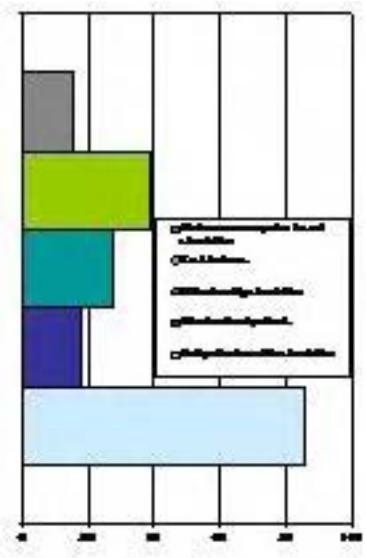
Results: One hundred twenty-nine (129) residents responded to the survey. Of those responding, 97 (75%) indicated they had simulation-based teaching during their residency. The types of simulation they had is outlined in Figure 1.

76 % of those responding found simulation-based training to be valuable and 71% believed they would seek simulation-based CME after their residency with 67% indicating that they would pay extra for simulation vs. lecture-based CME.

In the section for free comments a lot of enthusiasm was expressed for simulation training. There were however, many residents who indicated that although they generally found simulation useful for early training, they had received little or no simulation-based training beyond their first year of residency, and many doubted the utility of advanced training due to the lack of realism of the devices. Several indicated that simulation should not be used for credentialing or high-stakes examinations.

Conclusions: Despite pioneering work with simulation-based education, anesthesiology has yet to fully implement this modality amongst resident trainees across the country. The simulation experiences of anesthesiology residents are quite variable. Although time and monetary resources are frequently cited as limiting factors for simulation-based education, the less expensive modality of flat-screen simulation was utilized the least of all modalities with this group of residents. The factors influencing use of simulation-based instruction are unclear.

COI statement: None



Research Abstract : 34

Simulation for Training Internal Medicine Residents in ACLS – What did we learn?

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Background: Medical residents care for patients admitted to the hospital with critical illnesses and they are in charge with cardio-pulmonary resuscitation. The current ACLS course provides education in the current protocols but does not however, provide teaching about implementing these protocols or the management of the personal required for a successful resuscitation. The residents have a widely variable level of experience and comfort being code leaders. When a less experienced resident is running the code, there is a great potential for adverse outcomes.

Method: We used the HPS (human patient simulator) to help teach leadership and practical skills in the "Code Blue" setting. We had a period of 6 months of running mock codes to identify the main errors, weakness and strengths of our trainees.

We developed a protocol to correct the deficiencies, increase the capabilities and comfort of the residents on the code team with particular attention to the code leader.

We also developed a checklist based on the AHA guidelines of required skills for each specific scenario (5 for each resident).

Results

The main problems which were identified, were in order of the frequency: crowd control (residents have great difficulties in asking people to leave the room), assigning tasks to specific persons by name and then following if the assignment was completed correct, CPR done incorrectly and with too many inappropriate interruptions, not using TCP for asystole because nobody knew how to utilize it, not thinking of the differential diagnosis and just following automatically the protocol.

The residents' reaction was very enthusiastic. They recognized the need to learn in the safe environment of the simulation lab, in a "rebootable" setting. The residents considered that the ACLS training using medical simulator should be repeated 2 times per year to assure that skills are preserved. They considered that simulation sessions helped them better than the ACLS course to be a code leader, and function as part of the team.

Conclusions

Use of HPS scenarios for teaching ACLS is considered essential by the medical residents and most likely should be a required part of their curriculum. We also believe that residents should not be aloud to be "code leaders" before practicing enough in the simulation lab and declared by an attending that they master the minimum competency standard for ACLS.

COI statement: None

Research Abstract : 28

Development of an intraoperative stress intervention in the simulated operating theatre.

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Background

Stress, fatigue and burnout are recognised problems in surgery. Existing stress management interventions are general and most have not specifically addressed intraoperative coping. Previous work by our group identified potential stressors and categorised coping strategies[1].

In this study we developed a focused stress management intervention, using a cognitive behavioural approach within a simulated operative environment. We explored the use of trained actors to play key roles in order to provide flexibility and reliability of the roles, as well as overcome difficulties recruiting from clinical teams.

Aims

To develop a realistic simulated environment for surgeons to experience stress safely

To evaluate the effectiveness of actors playing clinical roles

To investigate the feasibility and perceived effectiveness of a stress intervention

Methods

The study took place within our simulated operating theatre (SOT), using a Laerdal SimMan patient simulator with models attached. Two professional actors were trained as an anaesthetist (AN) and one actor as a scrub nurse (SN). Training was provided by members of the research group and by clinician colleagues and addressed theatre protocol, instruments, equipment and technical language. The roles and actors' performances were reviewed after each simulation until no new questions emerged.

Two stress-inducing scenarios were developed, each with detailed roles for AN and SN. In scenario 1, stress was produced by the patient waking up, AN applying time pressure and the SN being uncooperative. In scenario 2, stress was produced by sudden onset of tachyarrhythmia requiring rapid completion, and an incompetent SN with limited English.

Five participants (3 surgeons and 2 medical students) were recruited to the study. Each received a preliminary presentation about stress management principles, and then underwent a 20 minute simulation in the SOT where the surgeon had been called away leaving the participant to finish (wound closure after laparotomy or completion of a saphenofemoral dissection, depending on experience).

Scenarios were digitally recorded and used to prompt discussion during debriefing (including perceived stressfulness of each stressor and what coping strategies were used). Participants completed questionnaires before and after each scenario (STAI anxiety scale, perceived stress scale and MC personality scale). Participants received guidance on coping strategies. In some sessions, a second simulation was carried out with different stressors to the first.

Results

The realism of the roles were rated highly by the participants, as was the stressful atmosphere created by team communication difficulties. Participants' responses to the different stressors varied, some finding time pressure more stressful than communication difficulties, while others perceived the time pressures to be "not their problem". When two simulations were run, there was variation as to which was more stressful.

Conclusion

We have developed a stress intervention tool for use in the simulated operating theatre during training. The use of simulated team members provides flexibility in the type and intensity of the stress and appears realistic. This study supports the hypothesis that a focused intervention can improve intraoperative stress coping. Further work will explore the impact of this intervention on surgical practice.

1. Wetzel CM et al, *Am J Surg.* 2006 Jan;191(1):5-10

COI statement: None

Research Abstract : 52

Utilizing Computer-Based Pelvic Simulators and Standardized Patients for Nurse Practitioner Student Instruction of Pelvic Examination.

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Background and Purpose

Nurse practitioner students often have high levels of anxiety regarding the gynecologic examination. Acquisition of two *PelvicExamSim* computer-based pelvic simulators manufactured by METI prompted faculty to initiate an educational intervention to evaluate and compare teaching effectiveness of the pelvic simulator with beginning nurse practitioner students in a large public university program. The current curriculum utilizes standardized patients -- genital teaching associates (GTA) -- who provide a relaxed and professional learning environment for skill development. The computer-based pelvic simulators provide direct, quantitative feedback to students as they practice their gynecologic examination skills.

Educational Intervention

Three outcomes were measured: 1) the most productive placement of the pelvic simulator experience in the curriculum, 2) student satisfaction with the pelvic simulator as a learning tool and 3) student perceived usefulness of the pelvic simulator compared to the GTA. Students completed an IRB-approved survey at the end of the educational session.

Feasibility

Although the initial monetary investment by the university was significant, investment of faculty time was nominal. Faculty training took less than one day.

Methodology

The computer-based pelvic simulator experience was incorporated into a 4-hour course orientation/pelvic examination training session during the first week of each semester for nurse practitioner students enrolled in the beginning-level women's health practicum. After spending the first hour in course orientation, students were randomly assigned to a small group. Each group was then assigned to a two-hour genital teaching associate training session and a one-hour faculty-led training session using the pelvic simulator. During the first semester, to aid in determining the appropriate placement of the pelvic simulator experience, two groups were assigned to the pelvic simulator training prior to the genital teaching experience; the remaining group received simulator training after the genital teaching associate experience.

Results

Students who had the pelvic simulator experience first reported reduced anxiety prior to the GTA experience. Students in all groups reported the pelvic simulators aided in learning the pelvic anatomy and the amount of pressure required for the bimanual examination. Students found the lack of realism to be a disadvantage.

Educational Merit

In the women's health arena, teaching tools can enhance feedback to students and faculty in ways that were previously unattainable. The combination of standardized patients and computer-assisted simulator expand the options available to faculty. The most basic of three learning modes available on the simulator was utilized in this intervention. Future utilization of two additional advanced assessment modes for quantitative student evaluation would enhance the usefulness of this learning tool.

COI statement: None

Research Abstract : 69

The use of interventional cardiovascular simulation to evaluate operator performance: The carotid Assessment of operator performance by the Simbionix carotid StEnting Simulator Study (ASSESS).

Giora Weisz[1,5], Jacque Devaud[2], Stephen Ramee[3], Mark Reisman[4], Gregg Stone[1], William Gray[1,5]
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Background: The percutaneous endovascular carotid stenting procedure has only recently been approved by the FDA, and interventional operators from multiple disciplines (Cardiology, Radiology, Vascular Surgery) are getting training in this field. The professional societies of these disciplines are looking for novel ways to assess the competency of an operator, before they grant authorization to perform this complex procedure.

Simulators have been suggested as tools to evaluate operators in specific procedures and operative techniques. The virtual reality machines can be used to capture numerous factors that translate into the success and safety of the procedure. These include selection of devices, accuracy of manual performance, reaction to interactive problems, use of adjuvant pharmacotherapy, management of hemodynamic changes, and prevention and resolution of complications. All of these can be automatically evaluated and scored by a complex software designed virtual reality simulator. The simulators that are used in Interventional Cardiology and endovascular therapy have not been validated yet as such assessment tool.

Objective: The main objective of the ASSESS study is to validate the simulator-based metrics as a tool to discriminate between different levels of operators.

Methods: We used the Angio-Mentor carotid Stenting simulator system (Simbionix). The simulators had been loaded with predefined cases demonstrating increasing complexity for stenting intervention.

Total of 34 operators (10 experts, 12 intermediate level, and 12 novice; based on prior reported experience) were asked each to do three cases of carotid stenting on the simulator. All the operators had the same cases that were selected to demonstrate increased complexity to judge anatomy, correct performance of the technical steps, use of wires, catheters, embolic protection device, balloons, and stents, adjuvant pharmacotherapy, and management of interactive hemodynamic response. During the procedure, multiple features of all of the above elements were automatically captured by the simulator. Each step and parameter captured had a pre-defined score. Scoring was based on penalty points for mal-performance, as pre-defined by a panel of independent experts in carotid stenting, prior to conducting the study.

Results: The study has been completed, and all the data that were captured is being analyzed. Full results will be available at the time of the presentation. .

Conclusions: Being able to demonstrate the ability of a hi-tech, virtual reality simulator to differentiate between different levels of interventional operators, may enlighten the simulator as a potential objective “examination tool”, to evaluate the performance and competence of an interventional operator. These will justify the use of Interventional Cardiovascular Simulation for certification and credentialing

COI statement: Giora Weisz - Consultant to Simbionix; Jacque Devaud - employee of eTrinsic, a division of Simbionix; other authors NONE

Research Abstract : 16

Emergency Medicine High Fidelity Simulation Case Selection: Who should decide?

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Background

Residency programs nationwide are utilizing high fidelity patient simulation (HFS) training with hopes of enhancing patient interactions, reducing medical errors, and assessing general resident competencies. At present time, little data exists concerning the methodology behind case selection for training sessions. Since HFS is generally employed to improve resident competence in patient management, should residents play a role in their simulation case selection? We sought to evaluate the differences between common cases currently used in emergency medicine HFS training and cases chosen by emergency medicine residents.

Methods

A systematic review was conducted of widely published simulation cases available on-line and in recent literature. Results from the review are summarized in Table 1. Residents at an emergency medicine training program in Orlando, Florida were asked to provide a list of the top three clinical cases they would like to review during a simulation session. Data from the survey are summarized in Table 2.

Results

Table 1: Common Clinical Scenarios Currently Used In Emergency Medicine HFS

Airway/Respiratory	Cardiovascular	Metabolic	Neuro	Trauma	Ob/Gyn	Other
Anaphylaxis	Acute Coronary Syndrome	Adrenal Crisis	Acute CVA	Blunt Abdominal Trauma	Ectopic Pregnancy	Coagulopathy
Asthma	Aortic Aneurysm or Dissection	Diabetic Ketoacidosis	Altered Mental Status	Burn Management	High Risk Pregnancy	Drug Error or Equipment Failure
Difficult Airway	Arrhythmia	Hypoglycemic Seizure or Coma	Cauda Equina Syndrome (atraumatic)	Compartment Syndrome	Missed Abortion	Ethical Issues
Esophageal Rupture	Cardiogenic Shock	Hypercalcemia	Guillane-Barre Syndrome	Extremity Fracture	Premature Rupture of Membranes	Heat-Related Illness
ETT obstruction	Endocarditis	Hyperglycemic Hyperosmolar Nonketotic Coma	Intracerebral Hemorrhage	Hemothorax	Pelvic Inflammatory Disease	Hypothermia
Massive Hemoptysis	Hypertensive Emergency	Hyperkalemia	Meningitis	Multiple Trauma	Perimortem Cesarean Section	Near Drowning
Pulmonary Embolism	Pericardial Tamponade	Malignant Hyperthermia	Seizures or Status Epilepticus	Spinal Cord Injury/Trauma	Preeclampsia and Eclampsia	Pediatric Resuscitation
Tension Pneumothorax	Pericarditis	Thyroid Disorders		Trauma In Pregnancy		Septic Shock

		Toxic Ingestions				Syncope
		Uremia				Undifferentiated Hypotension

Table 2: Resident Selected Simulation Cases (Number of Residents)

Airway/Respiratory	**Cardiovascular**	**Metabolic**	**Neuro**	**Trauma**	**Other**
Difficult Airway (21)	Acute Coronary Syndrome (2)	Diabetic Ketoacidosis (1)	Acute CVA (1)	Burn Management (1)	Disaster Management (1)
Tension Pneumothorax (2)	Arrhythmia & ACLS (19)	Toxic Ingestions (5)	Altered Mental Status (3)	Extremity Fractures & Reductions (1)	Ethical Issues (1)
	Pacemaker Emergencies (1)		Meningitis (1)	Hemothorax (1)	Pediatric Resuscitation & PALS (1)
	Pericardial Tamponade & Pericardiocentesis (6)		Nerve Blocks (1)	Laceration Repairs (1)	Psychiatric Emergencies (1)
	IO Placement (1)		Seizures or Status Epilepticus (3)	Multiple Trauma & ATLS (5)	Septic Shock (3)
	Central Venous Access (4)			Thoracotomy (3)	Undifferentiated Hypotension (1)
				Trauma In Pregnancy (4)	Ultrasound (5)

From a survey of 42 residents, 111 responses were elicited. Twenty-three of the 111 responses (21%) concerned airway/respiratory cases, while none of the 111 responses pertained to the review of basic obstetric and gynecologic emergencies. The most common category selected by residents included airway/respiratory emergencies (21%), followed closely by cardiovascular (20%) and non-airway procedures (20%). Critical clinical scenarios comprised nearly all of the resident responses (96%).

Conclusion

Although there is considerable overlap between the common topics currently utilized in emergency medicine HFS training and resident-selected topics, some discrepancies do exist. Currently, it is unclear how many, if any, simulation centers incorporate resident opinion into their simulation case selection. We propose that future simulation curricula should incorporate resident feedback during the case selection process. Striking a balance between the simulation scenarios residents yearn to practice, and those required to examine key competencies, will maximize the simulation experience for everyone involved.

COI statement: None

Research Abstract : 46

Screening of candidates to medical school based on non-cognitive parameters using a simulation-based assessment center.

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Introduction: Medicine, the art of healing and alleviating human suffering, requires that medical schools will responsibly select students who demonstrate both extraordinary humanistic properties and cognitive excellence. Yet, in most medical schools, selection processes rely almost exclusively on cognitive variables. We describe an innovative attempt to improve candidates' selection process by establishing an assessment center (AC), specifically designed to measure candidates' non-cognitive attributes. A central tool in the AC was comprised of simulation based stations (in an OSCE like manner), a tool widely used for clinical skills assessment that has recently been implemented in multiple high-stake applications (e.g., CSA – ECFMG), but is however, innovative in application procedures.

Materials & Methods: the AC included 3 assessment tools: (a) eight behavioral stations (BS); (b) an autobiographical questionnaire, which included 20 open-ended questions regarding the candidate's past experience; and (c) a judgment and decision-making questionnaire that posed three ethical dilemmas for the candidate's discussion. In the BS, faculty members trained specifically for the process scored the candidate's behavior according to a structured assessment form, consisting of four dimensions: interpersonal communication skills, stress handling, initiative and responsibility, and self-awareness. There were four BS types: (1) three simulation stations, in which candidates interacted with SPs in challenging interpersonal scenarios; (2) two debriefing stations, in which candidates were debriefed about their experience and behavior in the simulation stations; (3) A short structured interview station; and (4) two group-task stations, in which groups of six candidates completed tasks that demanded team work and cooperation. The AC was conducted at MSR, a simulation center uniquely and ideally designed for simulation-based assessment (i.e., multiple rooms equipped with one-sided mirrors). Each year (2004 & 2005) 288 candidates were tested over three days, each divided into two sessions of 6 hours. Each session involved 48 candidates (randomly allotted to the different sessions), 20 SPs, and 30 assessors (faculty members).

Results: measures of test reliability: (1) Cronbach Alpha coefficients, indicating internal consistency, range from 0.8 to 0.88 (computed separately to each assessment day); (2) inter rater reliability, computed based on correlations between 2 independent assessors scores, range from 0.62 to 0.77 for the BS and from 0.72 to 0.95 for the questionnaires; (3) test-retest scores correlation for 34 candidates who participated in the AC in successive years is 0.7. In addition, the correlation between the AC scores and candidates' cognitive scores approached zero, indicating an added value of the AC for the screening process. Finally, feedback questionnaires filled out by both candidates and assessors indicate that the AC is perceived as highly fair and appropriate for the screening to medical school (mean 3.1 ±0.7 on a scale of 1-4).

Conclusion: The combination of simulation based tools and 2 questionnaires, all measuring non-cognitive attributes, yielded a screening process (AC) with an added value over the cognitive parameters, satisfactory reliability measures and high face validity. In addition, an important message is delivered to students, faculty and the general public regarding the importance of the humanistic characteristics in the medical profession.

COI statement: None